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Advances in Measurement

Significance of the Physical Society's Exhibition

MAN'S power to visualise anything at all depends upon his ability to compare one thing with another, which he could not do without standards for measuring differences. This instinctive use of measurements causes them to be taken for granted; certainly without conscious thought of the methods employed, or overmuch regard for the makers of instruments whose products have become a fundamental tool for the observance of performance in practically every form of scientific investigation and for the convenient provision of industrial data.

Ability to measure and new knowledge progress together; the one pointing the way to the other which, in turn, is the spur to further achievements in measurements, which are truly essential to certainty. No other means of evaluation, however shrewd, can be so sure and, moreover, the facility of electrical measurement is not only directly applicable in many ways, but can also be employed for indirect indication and recording with a degree of exactitude not otherwise attainable.

Wide Variety

Consequently the products of the instrument section of the electrical industry are of a remarkable variety, necessitated by their employment spreading outward from investigational laboratories into commercial testing spheres and factories for process control, as must have been very evident to those who queued for admission on the first afternoon of the exhibition held last week at the Imperial College under the auspices of the Physical Society.

The show's appeal has not diminished at all and the scene seemed curiously familiar; it is something more than an exhibition, rather like a reunion, with the crowded attendance and lack of proper space combining at times to render some of the stands almost unapproachable, so eager is everyone to learn a little about the vital service performed by instruments under the urgent stress of war in many novel ways and in hitherto unheard of numbers.

British Makers' Achievement

The revival of the exhibition so soon and on a larger scale than before was no mean effort in the present transitional circumstances. Manufacturers have so much to describe and exhibit that it is not surprising that demand for space exceeded all pre-war proportions. It reflects the value they attach to the show's twenty-nine predecessors, which came to be regarded as the " nursery " for original design. In satisfying unprecedented demands upon their capacity and integrity instrument makers have raised the British product to a standard of excellence in respect of both constructional soundness and reliability of performance that is second to none.

The fact that reference elsewhere in this issue has been restricted, of necessity not from choice, to the Trade Section alone does not mean that the demonstrations in the Research Section were less worthy of attention. On the contrary they foreshadow more conveniences of measurement for the future, as distinct from achievements of the past, for these exhi-

bitions have been a definite stimulus to competitive ingenuity and skilled craftsmanship. May they continue increasingly to influence design, since instrumentalisation has become industrially indispensable to sustained effort on a large scale. The end is not yet in sight, nor will it ever be, for so long as man continues to make measurements he will need to devise means of more precise and facile observation in an endeavour to obtain from every performance the optimum of useful achievement.

Plugs and Sockets

DELIBERATIONS, commenced with the object of determining what form and size of socket-outlet and plug should be adopted as the "all-purpose" domestic standard, have taken a not altogether unexpected turn. The British Standards Institution has rescinded the resolution of its Electrical Industry Committee to up-rate the present 5-A, 250-V size. It thus reverts to the recommendations made in the supplementary report of the Electrical Installations (Study) Committee (convened by the Institution of Electrical Engineers for the Ministry of Works) as given in an appendix to Post-War Building Studies No. 11, subject to their endorsement by the I.E.E. Wiring Regulations Committee. The recommendations now reverted to were made upon " . . . the unanimous conclusion that a completely new type of 3 kW (230V) socket outlet and fused plug should be adopted. . . ."

Meeting Local Peaks

AN example of the aid rendered by private plants during the present shortage of generating capacity is given in this issue. Laid out as an emergency administrative centre during the war, with provision for storing 90 tons of fuel oil, the underground London "citadel" is still in use for Government offices. The station is designed to run in parallel with the local undertaking at 400 V, but a bulk supply is normally taken and, in the event of its interruption, a battery can maintain essential supplies during the couple of minutes or so required to run up the oil engines. In present circumstances the station is in regular commission for two or three hours each day during the winter as a means of relieving peaks on the public network.

National Pool

FORTUNATELY the worst fears regarding the vulnerability of this country's electricity supply in wartime were not justified. This was largely due to the existence of the grid, considered by some to be the most vulnerable part of the system, which enabled power to be sent from any part of the country to another. The precautions taken to prevent interruption of the transmission system, which to the more pessimistic seemed very inadequate, were actually not stretched to their limit. At the worst, the proportion of plant "on loan" from the national pool of emergency spare equipment did not exceed 1½ per cent. In this issue some details are given of the organisation and operation of the pool, for which the Central Electricity Board has been responsible.

Disposal Plans

IN this matter the Board has acted as trustee for the electricity supply industry: the equipment acquired is owned in equal shares by the industry and the Treasury. There were advocates of the maintenance of the pool for peacetime emergencies but the weight of argument was against this course. Consequently instructions have been given to the Board to dispose of the gear and with this object in view a general invitation has been given to supply authority engineers to inspect it. The transformers are not equipped with on-load tap-changing gear and would therefore have to be adapted somewhat but the switchgear is generally standard.

B.E.A.M.A. Directorship

WE have already reported Mr. V. Watlington's decision to retire from the directorship of the British Electrical and Allied Manufacturers' Association later this year. In this issue the Association invites applications for this position which is one of the most important in the electrical industry. It goes without saying that the post requires a very wide and intimate knowledge of the various branches of the industry—manufacturing, supply and export particularly—and ability to control and guide the activities of a large staff dealing with a very extensive range of subjects. Such men are not numbered in hundreds but there is no doubt that the industry will be able to provide a worthy successor to Mr. Watlington.

Physical Society's Display

Wartime Progress in Instrument Design

THE three-day annual display of measuring instruments and associated scientific apparatus, organised by the Physical Society, was resumed last week after the wartime interval of six years. The exhibits, largely electrical, were on view at the Imperial College of Science and Technology, being divided as before into a Trade Section representative of 112 manufacturers and a Research Section containing 35 contributions from industrial laboratories and experimental demonstrations of educational interest.

Discourses, delivered twice each day as usual, were on "The Optical Industry in the War," by Capt. T. Martin (Ministry of Supply); on "Radar," by Sir Edward Appleton (Department of Scientific and Industrial Research); and "Modern Plastics and Cements," by Dr. J. C. Swallow (I.C.I. Plastics, Ltd.).

Brief details of the trade section exhibits are given below:—

A.E.W., Ltd.—A thermocouple circuit-breaker of the "fuse-carry" type, measuring only 3 by 1¼ by 1 in. plugs into a socket base. It is made for 2, 5, 10 and intermediate settings for protecting small motors and other appliances taking large starting but small running currents.

Electric furnaces have been so designed that the elements can easily and quickly be replaced without the necessity of dismantling the furnace.

Automatic Coil Winder & Electrical Equipment Co., Ltd.—The "Avometer" for general purpose testing on AC maintains its accuracy of calibration at from 25 to 100 c/s and is reasonably accurate on the whole of the audio-frequency range. A number of ranges are provided by means of a simple push-button on the panel, which halves the normal range. The AC ranges have a self-contained rectifier in association with a transformer and the large number of ranges are all achieved with only three separate scales, length 5 in., and provided with an anti-parallax mirror.

Avimo, Ltd.—Film and paper cameras for use with oscillographs, or to be built into specially constructed cathode-ray equipment, are driven by universal motors and completely screened.

Baldwin Instruments Co., Ltd.—Apart from an X-ray dosemeter combining an ionisation chamber with electro-mechanical integrating and counting gear (*Electrical Review*, December 7th, 1945, p. 817) there was an electrometer due to Dr. F. T. Farmer, primarily for measuring electrostatic charges on small condenser chambers employed in radiological work to determine X-ray field distribution.

A meter for photographic process work makes it possible to repeat exposures accurately in spite of widely varying illumination intensity.

A radium detector with a gas discharge tube that becomes conductive when ionised enables the degree of radiation at which the tube strikes to be adjusted. The impulse is amplified and produces an audible note.

The "N.P.L." moisture meter for dielectric granular materials, due to Dr. L. Hartshorn and Mr. W. Wilson, consists of two triodes with anode voltage at mains frequency, but 180 deg. out of phase with each other, the grids being coupled together and fed through a circuit whose phase angle and voltage amplitude are dependent on the capacitance and conductance of the sample. The standing cathode potential difference thus produced operates the DC indicating meter.

Bristol's Instrument Co., Ltd.—A multiple cam impulse sequence cycle controller for plastics and tyre presses performs the time measurement and pilot valve operation separately, making possible the use of a large timing disc with a scale 25 in. long.

The "Pyromaster" potentiometer is direct marking without moving parts except when a change of temperature takes place. Balancing of the circuit is done electrically by a contacting galvanometer working the two-field potentiometer motor through telephone type relays.

British Electric Resistance Co., Ltd.—A new range of "Bercohm" vitreous resistors includes a series embedded in tropical grade enamel; there is an unusual form of bakelite bobbin resistor for voltmeter multipliers. There are new types of enclosed stud switches and rotary potentiometer controls for tropical use are enclosed in a sealed metal container.

British Rototherm Co., Ltd.—A co-axial bi-metallic thermometer with electrical contact head has been specially designed for industrial control of temperature to as close as 0·1 deg. C. A vertical design to resist heavy vibration employs a multi-helix bimetal element with a newly designed universal coupling and gear box with stainless steel bearings. There is an electrical indicator of the ratiometer type for aircraft engine-oil and radiator temperatures.

Cambridge Instrument Co., Ltd.—A portable electrocardiograph completely contained within a suitcase measuring 20 by 11½ by 9 in., including AC rectifier and all accessories, weighs 45 lb. The galvanometer is fitted with a fibre string which can be easily replaced and is automatically centred in the field.

An electric micrometer thickness gauge for steel rolling mills enables variations of 0·0001 in. to be determined on material of low compressbility factor up to ¾ in. thick.

The thermometer regulator has been completely redesigned for 20 A (AC or DC) at up to 250 V and can be employed between the limits of —10 and +1,100 deg. F. An instrument of similar appearance is adapted for controlling gas-heated processes, while a regulator for pressures up to 750 lb. per sq. in. is of similar design, the thermometer movement being replaced by a Bourdon tube.

With the suspended coil fluxmeter it has been

difficult to obtain a steady zero from which a record can start. This has been overcome by electrostatic deflection of the pointer to zero.

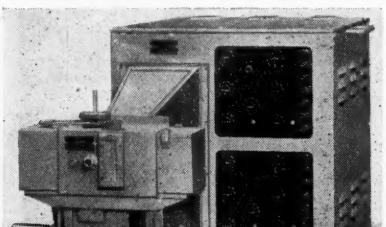
R. M. Catterson-Smith.—A furnace with a molybdenum element for up to 1,600 deg. C. has been wound (for H. Hughes & Sons, Ltd.) non-inductively so as to minimise the magnetic field within the heating chamber. The latter is surrounded by an additional coil to create a known DC magnetic field inside. A crucible made (for Rotax, Ltd.) by winding molybdenum wire round an alumina tube, with gastight door, is to be used for melting metals experimentally.

For work needing a non-oxidising atmosphere a bell furnace (for Linread, Ltd.) has a sealing flange dipping into a trough containing oil or an easily fusible alloy. A cylindrical heater with hinged castings, split vertically, and a curved tunnel with elements embedded in moulded one-piece heat insulation have been made for electric lamp manufacturers.

Chance Bros., Ltd.—The multi-circuit rotary "Austinlite" switch is designed for back-of-board mounting, three holes only being needed. The main components are plastic mouldings which are easily dismantled. Higher and lower ratings than the nominal 30 A at 400 V are obtainable.

E. K. Cole, Ltd.—Special valves which have to be very accurately assembled for "Radar" purposes were made possible by glass-to-metal sealing. Oil-filled transformers have been developed of small size for very high voltages which are capable of dealing with 12 kV pulses; they are wound with special regard for uniform distribution of stresses. Moulded trimming condensers will handle radio-frequency peak pulses of 5 kV. The smaller of two wireless transmitter-receiver pack sets for military uses weighs complete 9½ lb. Typical of a variety of mouldings was a small sample containing 52 inserts moulded with an accuracy of ±0·001 in. between centres.

A. C. Cossor, Ltd.—A portable double beam oscillograph, which is interchangeable with a conventional single beam tube of the same make, has a specially designed camera for single exposures of recurrent waveforms or moving film records of transient phenomena.



Transportable multiple cathode beam recording outfit (Cossor)

An electrocardiograph that is transportable in two units, one being the recorder and the other the independent AC mains power supply unit, uses a cathode-ray oscillograph; in addition to photographic recording, long period direct visual observation is made possible by a push-button switch as often as required.

A multiple recorder comprising a twin double cathode beam unit mounted on the same bedplate with a film camera and its drive unit is a robust transportable outfit for all types of oscillograph traction, naval and engine tests. Three tube units mounted one above the other and three interconnected cameras furnish twelve simultaneous records plus three independent time or event markings.

Dawe Instruments, Ltd.—Electronic apparatus includes flash units for industrial photography and stroboscopes for rotating and oscillating mechanisms. A mains-operated insulation test set has ranges of 200 megohms at 500 V and 400 megohms at 1,000 V.

Decca Navigator Co., Ltd.—This secret war-time development operates on the principle of phase comparison of unmodulated low-frequency signals emanating from three synchronised radio transmitting stations. Skilled operation is not necessary. The method functions as an approach system with a short range accuracy of the order of 15 yards as well as for medium and long range position finding and navigational guidance.

Drayton Regulator & Instrument Co., Ltd.—Apart from hydraulically formed metal "Hydro-flex" bellows and type-RQ small motors with integral gear train and self-switching device for actuating valves, "Hays" instruments are made for measuring suction, pressure and draught with diaphragm membrane made of goldbeater's skin, both indicating and recording.

Ebonestos Industries, Ltd.—This range of moulded plastic substances, including "Ebonestos," represented types of products supplied to various Government Departments during the war, the majority of the exhibits being applicable to instrument making and aircraft production.

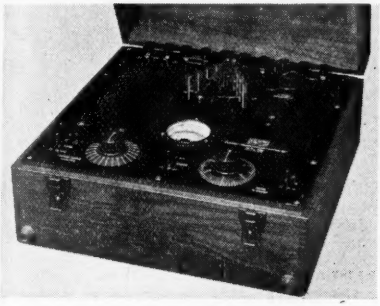
Electro Methods, Ltd.—A gauge for maintaining the vacuum in a pump circuit at a pre-set constant value automatically utilises a barometer tube with one closed arm containing the mercury; the other arm is connected with the vacuum and also contains the setting mechanism, consisting of a rotating magnet turning a screw sealed into the arm. When pressure in the pump circuit falls, the mercury rises until at the pre-set point it makes contact and energises a relay which causes the valve of an automatic "leak" to open. A small amount of air is allowed to enter the vacuum, causing the mercury in the pressure gauge to fall, breaking contact.

Elliott Brothers (London), Ltd.—A new instrument with a guaranteed accuracy of 0·05 per cent. for testing laboratory standard and sub-standard wattmeters and voltmeters with AC by direct-comparison with a DC 4 V potentiometer (see *Electrical Review*, December 21st, 1945, p. 914) is independent of the usual sources of error and has a scale equivalent to that of a deflectional instrument 18 ft. long.

A suspended wattmeter, portable and deflectional, is suitable for up to 20 kc/s, while a

low power factor wattmeter of new design is intended for 0·5 and 1 A at 100 and 200 V with 10-W ranges, being compensated for power consumed in its own windings.

A deflectional frequency indicator for 1,000 c/s at 100 V with an 8-in. dial is of the Shotter pattern, operating on the differential principle. The Powell graphic recorder of "time difference" (between Greenwich and synchronous) has a chart ruled in seconds, fast and slow. A portable iron-loss test set has



Comparator for AC wattmeters and voltmeters (Elliott Bros.)

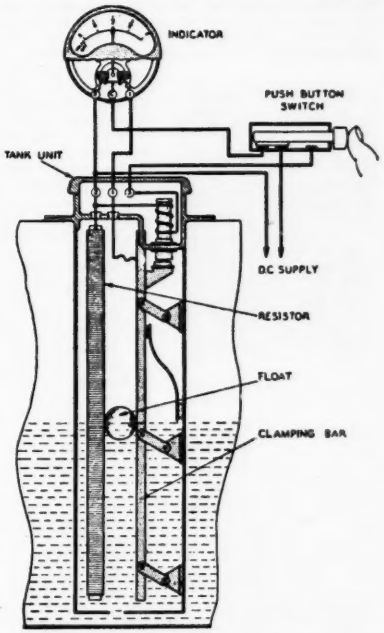
been evolved principally for selecting samples of magnetic materials used in current transformers for operating at very low induction densities; it indicates the in-phase and out-of-phase components of the exciting current.

Evans Electroselenium, Ltd.—Selenium photocells of the barrier layer type, self-generative, are available in five circular and five rectangular sizes, with or without a colour correction filter to bring the spectral response very close to the "average human eye" curve. Various applications were shown.

Evershed & Vignoles, Ltd.—An ohmmeter for determining the continuity and resistance of circuits through which, for reasons of safety, the current must not exceed a specified amount is used primarily for testing detonator and shot firing circuits in coal mines.

A free-float fuel gauge (Marchment patent) is novel in that there is no external float or arm. The transmitter is a resistor equal to the full depth of the tank with a small metallic float, normally pressed against the resistor by a spring-urged clamping bar, and a solenoid which lifts the clamping bar and frees the float, all enclosed in a light metal tube with a small hole in the base, which acts as a still-pipe. The indicating ohmmeter, of the ratiometer type, has two coils, one in series with a fixed resistance and the other in series with part of the resistor in the tank unit, both coils being in parallel across the DC supply voltage. The readings are therefore independent of voltage fluctuation.

A roll-float fuel gauge does not need depression of a button switch. A cylindrical metallic float, in two halves, is separated by an insulating bush. The positive pole is connected to one half and the negative pole to the other by two wires under tension, each wrapped round the corresponding half of the float to keep it securely pressed against the resistors, but enabling it to move freely up and down. The indicator is a permanent magnet rotor and a stator having three coils with axes at 120 deg. As the float rises so the magnitude and direction



Free float fuel tank gauge (Evershed & Vignoles)

of the current in each coil changes, causing the rotor to turn in a clockwise direction.

Ferranti, Ltd.—Controlling and actuating circuits of the electronic relay type were represented as well as hermetically-sealed miniature measuring instruments.

There were also miniature relays similar to the P.O. type in sealed glass cases for the tropics, while navigational devices included a homing indicator with two movements operating in a common magnetic circuit and a blind landing indicator with two separate movements for beam landings.

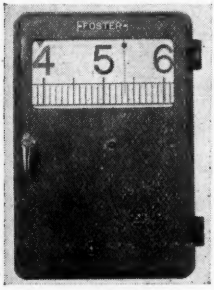
A new lamp for photographing objects moving at high speed is a "Magalite" argon-filled tube that is caused to flash by the passage of the discharge from a high-voltage condenser; the instant of flash is determined by a "Servotron" tube in series with the lamp.

The "Synchrolite" electronic stroboscope with controllable rate of flashing can also be used as a tachometer; it uses one of the company's new "Neostron" neon-gas lamps with a synchronising pulse that may be external or "locked" to the supply mains.

The latest electrometer valve for measuring down to 10^{-17} A is a double tetrode with a single filament and two separate grids in glass tubes to insulate them highly from the other

electrodes. An automatic predictor gunsight with gyro-optical system was shown.

Foster Instrument Co., Ltd.—An illuminated "Teloscale" for the indicators of potentiometric thermo-couples and resistance thermometers projects an enlarged image of the pointer as well as the selected operative part of the temperature scale on to a self-luminous screen. A miniature potentiometric indicator having an effective scale length of about 10 in. is used with telescope pyrometers with optical systems of the "disappearing filament" lamp-bridge type.



Illuminated selective "Teloscale" (Foster)

Temperature measuring appliances included an mV indicator with 10-in. edgewise mirrored scale and suspension type moving coil of high internal resistance; a high-speed pyrometric recorder of the amplifying photo-electric type; and a potentiometric balancing heat input regulator with value positioning device, which establishes equilibrium by automatic analysis.

Gresham Transformers, Ltd.—A variable transformer has a new cylindrical on-load tap changing switch with internal rotating brushes, manually controlled, for up to 100 A at 0 to 230 V in 2-V steps.

High voltage DC power supply units of up to 200-kW output are designed for electronic heating equipment and comprise a three-phase main transformer and valve filament transformers all oil immersed.

A voltage selector for laboratory use is a single-phase transformer having tappings brought out to rotary switches arranged in decade (hundreds, tens and units) and engraved discs on the switches indicate through their windows any setting from 1 to 599 to the nearest volt. A portable insulation flash tester delivering up to 2,500 V R.M.S. was shown.

Hendrey Relays, Ltd.—A combination synchronous motor and solenoid relay forms an accurate timing device for long-period delays; the solenoid brings the mechanism into operation when the coil is energised and holds on over the required period.

Adam Hilger, Ltd.—A new chemical analysis outfit consists of an all-metal continuously evacuated X-ray tube with four windows for separate cameras.

A recording infra-red spectrometer for the analysis of complex hydrocarbons, such as high octane fuels, embodies a double beam system which compensates for the variation in emission of the light source.

Honeywell-Brown, Ltd.—An electronic potentiometer pyrometer utilises a simple reversing two-phase motor action to minimise mechanism subject to wear. An auto-pilot gyro system, entirely electric, detects displacement of aircraft from any of three axes.

Jackson Automatic Electric Controls, Ltd.—An electronic resistance ohmmeter and insulation tester impresses DC on unknown and known resistances in series. The voltage drop across the standard is a function of the current through the unknown resistance and is measured by a valve voltmeter comprising a remote cut-off pentode giving a suitable scale law.

Johnson, Matthey & Co., Ltd.—This exhibit included examples of headed, turned and composite contacts in silver, platinum, palladium and their alloys for use in instruments where contact resistance must be kept to minimum values; also complete contact springs and sub-assemblies; accurately rolled strip from 6 down to 0·01 in. wide and down to 0·0005 in. thick for the production of diaphragms and hair springs, fine strip in gold-covered silver and "JMC" gold alloy for galvanometer suspensions.

"Minalpha" manganese-nickel-copper alloy constant resistance wire developed to replace "Manganin" has a temperature co-efficient of $\pm$ 0·000003 over the range 10 to 40 deg. C. with a thermal e.m.f. against copper of 0·30 microvolt per degree C.

Extremely fine bore thin-walled aluminium and "Duralumin" tubes for instrument pointers have outside diameters down to 0·01 in. and wall thicknesses down to 0·001 in.

George Kent, Ltd.—A recorder of air and gas flow at low pressures is differential with an integrating AC motor driving a shaped cam and a style which follows the ring balance movement; thus during each time cycle an appropriate amount is added to the cyclometer counter.

The latest close pyrometer control for furnaces moves fuel valves and air dampers proportionately to temperature change while a floating (reset) element provide automatic "droop" correction for changes of furnace loading.

Labgear, Ltd.—An instrument for the direct measurement of impedance between 3 and 5,000 ohms in two ranges at radio frequencies may be AC mains energised or utilise any audio-oscillators delivering 50 V. It can be calibrated at up to 20,000 k/cs, the accuracy at 50 c/s being within 10 per cent.

A voltmeter of the self-biased plate-rectification valve type for 0·5 to 100 V with a high input resistance at from 15 c/s to 75 Mc/s is mains energised and incorporates a midget valve in the probe applicator.

Leland Instruments, Ltd.—Apart from a mains driven source of power for laboratories providing a very smooth DC output, continuously variable from zero to 1,500 V, the mains driven "Mervyn" phase and frequency meter for power stations checks frequency and indicates the gain or loss on time-controlled mains.

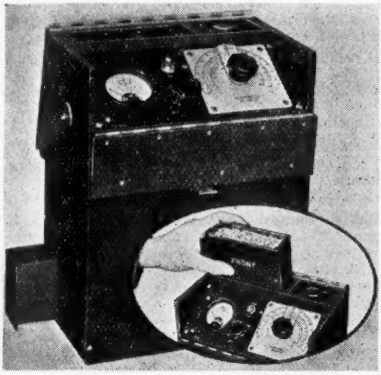
Londex, Ltd.—High-frequency change-over relays for antenna transfer, band switching, or keying, have insulating members carrying the pure silver contacts made of "Polystyrene."

An automatically self-resetting process timer driven by a synchronous motor utilises an electromagnetic clutch and continuously revolving cam for actuating the contacts of different kinds, which are rated at 500 VA, so that an infinite number of settings can be made on the dial.

Marconi Instruments, Ltd.—Apart from pH measuring equipment (see *Electrical Review*, November 2nd, 1945, p. 624) the company

showed electronic moisture-in-grain meters for making ± 1 per cent. determinations in a few seconds.

Among medical apparatus was an electro-



Portable moisture-in-grain meter (Marconi)

encephalograph for recording brain potentials as an aid to the diagnosis of cerebral disorders. A new integrating X-ray dosemeter based on the design of Dr. F. T. Farmer incorporates in the counter clock a pre-set mechanism for switching off the X-ray beam. Also shown for the first time was "Theratherm" 350-W ultra-short-wave therapy equipment for either cable or condenser technique.

For testing radio receivers there are signal generators for either or both amplitude and frequency modulation. An electrostatic viewing instrument, has been designed by the company for investigating the performance of pulsed radio-frequency.

Marconi's Wireless Telegraph Co., Ltd.—A show case illustrated the production of quartz plates associated with an historical survey of phenolic resin and polythene holders in various sizes and shapes, together with the latest developments in evacuated glass bulb technique. Another case contained magnetrons in section showing their design.

Measuring Instruments (Pullin), Ltd.—An electronic resistance and capacity bridge for testing leakage and power factor, with 110/250 V input has a scale that is linear to facilitate estimation of values between calibrated points by comparison with selected internal standards. The null indicator is so arranged that an out-of-balance of ± 1 per cent. is easily discernible.

A pocket size (1·5 V battery) universal tester has six ranges each of AC and DC voltage and milliamperage on separate scales with a third for resistance.

Position indicators with ratiometer movement (overall size very small) are designed for grouping the edgewise cases in numbers on one control panel.

Metropolitan-Vickers Electrical Co., Ltd.—A 50 kV electron microscope now being manufactured is a development of the experimental instrument built in 1936 for the Imperial College (London) and the resolving power (better than 100 Angstrom units) will allow a further enlargement of the photographic image of two to five times, giving an overall magnification up to 50,000 times.

An X-ray spectrograph devised for chemical analysis, evacuated to reduce absorption effects, has oscillation angles of 25 and 5 deg.; a removable attachment facilitates accurate positioning of the crystal.

An electrostatic voltmeter that is free from the deleterious effects of dirt, draughts and moisture exerts a large torque by virtue of the use of a high vacuum as the insulating medium, so enabling the voltage gradient between the vanes to be raised above 100 kV/cm which is at least ten times the safe limit in an air-insulated instrument. The experimental continuously-evacuated model measures up to 300 kV with an accuracy of ± 0·3 per cent.

Surge divertors illustrate the uses of non-ohmic "Metrosil" for the protection of high-voltage power circuits and to suppress sparking at relay contacts. There was a fluorescent crack detector; a direct-reading indicator of magnetic field strength from 100 to 1,500 œrsteds; and an electrical evaporation plant for the deposition of metals and their compounds on to glass and other surfaces in a high vacuum.

Electron (50-kV) microscope (Metro-Vickers)

Morgan Crucible Co.,Ltd.—Crucibles, tubes and other furnace components made of recrystallised alumina, beryllia, magnesia, zirconia and thoria were shown.

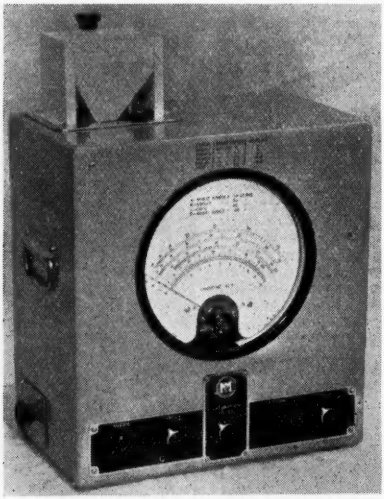
M.O. Valve Co., Ltd.—This selection of radar valves and components included new magnetron types, other war-time designs of miniature size for communication purposes and new valves for industrial heating requirements. Valve manufacturing aids demonstrated were a machine incorporating a welder of the lamp-controlled relay type for making squirrel-cage grids composed of sixty wires and optical gear for centering close clearance valve electrodes.

Muirhead & Co., Ltd.—A multi-range radio-frequency bridge is a commercial development of a design by the B.B.C. Research Department and will measure impedances, both inductive and capacitive, under practically all conditions.

A mains energised direct-reading pH meter developed in conjunction with Mr. R. H. Thorp, of the Wellcome Physiological Research Laboratories, indicates directly, without the necessity of rebalancing for successive measurements with very small quantities of solution.

A quartz-insulated precision variable air condenser with a very small loss angle was shown.

Mullard Wireless Service Co., Ltd.—A moisture-in-grain meter is operated by the change of capacity produced between two plates of a condenser by the insertion of a weighed quantity of grain, the dielectric constant of the latter depending upon its moisture content. There are directly calibrated scales for wheat, oats and barley, with an arbitrary scale for other granular substances.



Multi-scale moisture meter (Mullard)

There were also shown cathode-ray oscillographs for revealing either low or high frequency phenomena and a beat frequency oscillator for use as a source of power.

Nalder Bros. & Thompson, Ltd.—Instruments with 1·5 to 20 in. dials for indicating from 1 μA upward have a moving coil within a concentric cylindrical permanent magnet and are not affected by stray magnetic fields. Hermetically sealed miniature models for service in the tropics are proof against water, shock and vibration and are claimed to function satisfactorily at up to 85 deg. C.

Rectangular illuminated models have a moving coil that withstands the Admiralty "shock test B" and maintain BS first grade accuracy. There is a phase meter scaled in electrical degrees, single-phase, with an accuracy within ± 1 degree over a wide range of current. Frequency meters included a recorder of 47 to 52 cycles and a chart speed of 1 in. per hour.

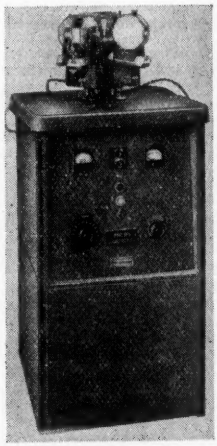
A new "vector-meter" (Futcher patent) affords simultaneous readings of kW, KVAR, p.f. and A at a glance. The relays shown included the "Wattmetric" earth-fault relay for use on systems protected by Petersen coils and a new timing relay for DC or AC circuits.

D. Napier & Son, Ltd.—An aeration meter designed to measure the air content of the oil in an engine lubricating system and an electronic indicator of the incidence and severity of detonation in an i.c. engine were shown.

Permanent Magnet Association.—"Alcomax II" is a nickel-aluminium-cobalt-iron alloy characterised by markedly anisotropic properties, which is utilised for special purposes.

Philips Lamps, Ltd.—New X-ray diffraction apparatus for both University and industrial laboratories is self-contained with the generator in the base of the cabinet (including the tube filament transformer), consisting of a centre-earthed transformer and two oil-immersed rectifying valves. The indirectly illuminated control panel allows stepless variation from 10 to 60 kVp, and an hour meter (10,000 hours and reading to 1/10th hour) records exposures and tube life.

For certain applications an X-ray spectrometer with a scannng device, having a Geiger-counter tube traversing a graduated quadrant, is used in combination with suitable measuring circuits.



X-ray diffraction analysis cabinet (Philips)

W. G. Pye & Co., Ltd. — The sine/cosine wave form generator developed for the M.A.P. is a precision instrument capable of application in a number of ways to electronic navigational equipment.

A generator for the production of complicated wave forms in great variety by the use of suitable cams, primarily designed to provide a five-line Raster scan waveform, is driven by a small motor through reduction gear.

Record Electrical Co., Ltd.—The Shirley moisture meter is a quick means of determining moisture regain in cotton, wool, rayon, and other yarns by electrical resistance which is measured with a special electrode connected in the grid circuit of an amplifying valve.

An electromagnetic thickness tester depends on resistance variation; to the sample under test is applied a spear consisting of a transformer with a primary winding in the middle and two secondaries, one at each end, in opposition. The thickness (conductivity) of the sample determines the amount of out-of-balance.

A universal multi-range ohmmeter has an ingenious mechanism whereby the scale is changed by the same knob as changes the range, thus avoiding the possibility of error in reading. Control equipment for obtaining any desired combination of street lighting, etc., uses a number of solenoid-operated mechanisms having a specially shaped cam, to actuate the contacts.

A leakage trip specially designed for situations where effective earthing is impracticable uses the neutral wire as a temporary earth and gives an audible warning.

Rediffusion, Ltd.—Examples of " Redifon " radio-frequency heating included a vacuum pump connected to a bottle containing powder or tablets between electrodes connected to a 200-Mc/s generator, which thus heats the contents of the bottle. The point at which the moisture is driven off depends on the reduction of pressure achieved by the pump.

Salford Electrical Instruments, Ltd. (G.E.C.).—Various bridges included a standard Wheatstone resistance type of new design. Among valve voltmeters is one for up to 10,000 V specially made for high-frequency heaters in the plastics industry and an electronic model incorporating a cathode-ray tube for measuring brief impulses. A photometric lightmeter will measure the brightness of distant scenes up to several miles for photographic and other needs while the " Miniscope " is a self-contained oscilloscope of unusually small size, incorporating a 1½ inch cathode-ray tube. For more normal purposes is the new " Selectest " multi-range portable meter for measuring DC and AC voltages at ordinary and high frequencies and also DC resistance. There was a vibration analyser for investigating the behaviour of machinery, a strain-gauge amplifier, an impactometer with associated calibrator for determining the intensity of mechanical shocks, and a photoelectric colorimeter of special design for vitamin " A " estimation by means of the Carr-Price reaction. Among components were sapphire jewels for instrument bearings, quartz crystals, magnetic dust cores and a range of optical components.

Sangamo Weston, Ltd.—To laboratory standard instruments of a new series with 12-in. scale switches have been added for convenience in range-changing and they are also provided with a spirit-level, levelling feet, and a thermometer to indicate the temperature of the movement for corrections to be made when extreme accuracy is necessary. The moving-coil types are magnetically shielded and all dynamometer instruments are doubly magnetically shielded while watt-meters have, in addition, an electrostatic screen between the moving and fixed coils to prevent errors.

Moving-coil relays have a pinion drive for varying the mean operating point and a fine screw-adjustment for changing the position of the fixed contacts. One type with magnetic contacts will not release until re-set.

Scientific Acoustics, Ltd.—A general purpose dielectric heater of over 2 kW at about 45 Mc/s. is completely self-contained and self screening. Its overall dimensions are 25 in. by 20½ in. by 4 ft. high and its power consumption is 3·8 kVA, from 400 to 415 V mains.

A bridge developed in conjunction with the Research Department of the B.B.C. is capable of measuring 2-terminal admittances at between 100 kc/s and 60 mc/s with an accuracy greater than ± 5 per cent.; the application of correction factors extends the range up to 100 mc/s.

Scophony, Ltd.—Dynamic balancing equipment for small high speed rotors causes an oscillating motion of the cradle which, by means of an electrostatic pick-up, produces a sinusoidal e.m.f. proportional to the out-of-balance mass. This is split into two components in quadrature and applied to the plates of a cathode-ray tube, producing a circular trace, the diameter of which shows the amount of out-of-balance.

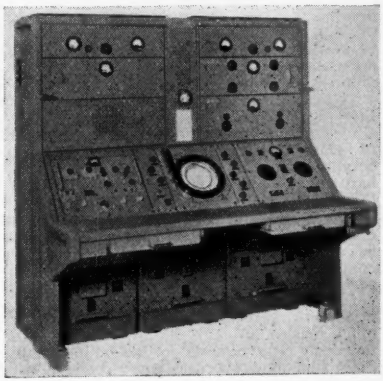
Among miniature motors shown was a one-watt size for attachment to the gimbal ring of a gyroscope for precessing or levelling when fed with high-cycle current without the use of a conventional rotor and gear box. The volume of the motor is less than 1 cu. in.

S. Smith & Sons (England), Ltd.—Tachometers of the eddy-current type with pointer deflection produced by the action of a rotating magnetic field on an aluminium cup, have no direct connection between the driving spindle and the pointer assembly.

The " Desynn " system of remote electrical transmission of indicator movement embodies a circular resistance with three equally spaced tappings and diametrically disposed rotating contacts carrying the 24-VDC input. An alternative micro-transmitter has two cylindrical resistances, tapped and connected in a manner electrically similar with input going to sliding contacts on a rocker shaft.

A slotted iron stator with star-connected three-phase distributed winding is joined to the tappings of the transmitter resistance. Within the stator is pivoted a permanent magnet, forming a two-pole armature carrying the pointer. The position of the contacts of the transmitter resistance influences the strength and direction of the currents in the indicator stator windings, causing the armature to assume a position dependent on that of the transmitter contacts.

Standard Telephones & Cables, Ltd.—An instantaneous reading radio compass is an automatic direction finder functioning at very high frequency to give continuous visual indication of bearings on a cathode-ray oscilloscope.



Instantaneous radio compass outfit (Standard Telephones & Cables)

It is made up of a main unit (illustrated) with a fixed H-type Adcock antenna and, if required, one or more remote indicating units incorporating cathode ray oscilloscopes. These may be situated at distances up to five miles from the main unit. Bearings are indicated automatically with correct " sense " by a single radial line.

Sunvic Controls, Ltd.—Apart from vacuum switches and bimetal relays for use as time delays, thermostats were shown operated by bimetal helices, and having a sensitivity of one-tenth degree C, with fine and course adjustment of setting up to 500 deg. C for proportional regulation of power imput.

An electronic relay energised by a few micro-amps and capable of controlling up to 2 kW contains a thyratron gas-filled relay and a vacuum switch. A proportioning toluene regulator attachment improves performance about ten times and operates in conjunction with an electronic relay.

A bridge which measures resistance on a logarithmic scale employs a thermionic valve and microammeter as a null balance, detector, being battery operated and primarily intended for the measurement of moisture. Various fire detectors, both for civil and aircraft purposes.

Taylor, Taylor & Hobson, Ltd.—The " Talysurf " outfit for determining the roughness of surfaces is mounted on a castor trolley for mobility, with the amplifying equipment on a shelf below. The pick-up head with a sharply pointed diamond stylus is traversed across the surface by motor-driven gearing. The up and down riding movement is converted into correspondingly varying electrical current, which is amplified for actuating measuring instruments.

Telegraph Condenser Co., Ltd.—Tubular paper capacitors in glass tubes for use where a metal case is undesirable will withstand three cycles of BS/RC.S/130 boiling water test and prolonged heating at up to 70 deg. C. Capacitances from 0·001 to 0·1 μF for working voltages from 200 to 500 V (DC) are made, and tubular ceramic capacitors in glass tubes are similar in external construction.

Disc mica capacitors (transmitter type) for heavy currents at high radio frequencies are contained in brass cases 1¼ in. in diameter, one pole being connected to the case and the other to a screwed connection. A series string may be made up. These carry up to 40 A at a maximum r.f. voltage of 250 RMS; the maximum kVA per disc is 10.

Telegraph Construction & Maintenance Co., Ltd.—This selection of special metals included alloys of high permeability, others for sealing to glass, electrical resistance varieties and beryllium copper as well as examples of age hardening, moulded products and of cables of the high-frequency and " low loss " classes.

Telephone Mfg. Co., Ltd.—An electrically-operated half-second pendulum clock that can be accelerated or retarded by external time-controlled energy from synchronised mains, periodic impulses from a freely swinging pendulum, or a quartz crystal system, can be fitted with up to five heavy-duty contacts giving quick make-and-break impulses to drive simultaneously large numbers of half-minute impulse dials, staff time recorders, turret dials, industrial process timers, in addition to a mechanically driven " Chronogram " (pre-selected signals programme ringer) for the operation of any one of three circuits (or either of two or both together) at any pre-selected minute during a week, each day having a different programme if desired.

H. Tinsley & Co., Ltd.—The latest resonance set (N.P.C. design) for measuring the resistance, inductance and capacitance of dielectric specimens at radio frequencies has a new electrode head and mains-operated oscillator with stabilised input. For chemical and medical micro-analysis there is a polarograph combined with a DC amplifier for actuating an ordinary portable ink-graph recorder.

Electrical gauges for measuring mechanical strains in aircraft, buildings and structures employ a bridge with a slide wire calibrated directly in percentage change of the resistance of the gauge element which is subjected to strain. The associated automatic recorder includes a 100-way motor-operated apex unit and DC amplifier with a combined response time of 0·2 sec. from zero to full scale.

A course correcting compass for aircraft utilises movement of a magnetic mirror in an oil bath to operate an electronic device which rotates the whole on its base; thus movement is considerably amplified before it is passed on to the automatic pilot on the " Selsyn " system.

W. Vinten, Ltd.—A cinema camera capable of taking up to 275 pictures per second for recording high-speed movement at close range or, with suitable lenses, at distances of some miles is driven by single- and double-ended motors, battery energised, and an electrically maintained tuning fork exposes a timing mark on the edge of the photographic film every fiftieth of a second.

Westinghouse Brake & Signal Co., Ltd.—The latest " Westalite " rectifier is an improved double-voltage type which operates at twice the reverse voltage per element with practically the same forward voltage drop. The reverse characteristic is very sharp, the current varying as the twelfth power of the voltage, and use is made of this in voltage limiters.

Copper-oxide rectifier improvements consist of " miniaturisation," hermetic sealing against moisture, and elimination of graphite as a contact material to improve stability.

Wild-Barfield Electric Furnaces, Ltd.—Self-contained dielectric heating equipment designed primarily for plastic moulding materials has an input of 4 kW and delivers up to 2 kW at 30 mc/s. It is single-phase for operation off 200/250-V mains. A feature is automatic power control which compensates for any change in characteristics of the material being heated and hence prevents overloading of the generator. The portable " Resilia " pyrometer testing furnace for use with any standard workshop potentiometer is intended for normal routine checking.

Zenith Electric Co., Ltd.—An automatic voltage regulator comprises a toroidal transformer providing a multiplicity of tappings with motor-controlled selector mechanism operated by a voltage sensitive relay in such a way that the regulator is not called upon to control the whole of the energy used by the consumer, but serves only to supply the deficiency.

Insulation testing equipment was shown for up to 3,000 V with the handles of the test prods so designed that as soon as they are released the metal parts are automatically covered.

All-Electric Farm

Grain Drying by Electricity at St. Helens

By T. S. Parkinson, A.M.I.E.E.
and
G. L. Tomlinson, A.M.I.E.E.*

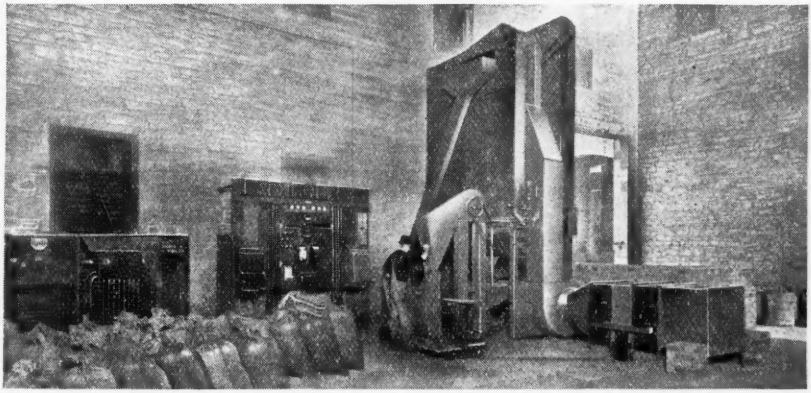
OF 209 farms in the supply area of the St. Helens Corporation Electricity Department 80 per cent. are now connected. Of these the all-electric installation at J. Heyes & Son's Mossborough Hall Farm, Rainford (450 acres), which dates back to 1324, is of especial interest, particularly in connection with an electrically heated grain-dryer and a pea viner.

The grain-dryer, which is used in conjunction with a combine harvester, is of Mather & Platt manufacture, originally designed for coke firing. This plant has an output of one ton an hour and reduces the moisture content from 22 per cent. to 16 per cent. at 150 deg. F., maximum air temperature. Both hot air fan (5,000 cu. ft. per minute) and cold air fan (2,000 cu. ft. per minute) are driven off the same shaft by a 5-HP squirrel-cage motor which also drives the bucket-type grain feed elevator.

The electrical heating equipment consists of primary and secondary heaters (Unity) in the air inlet duct, designed to give a maximum air temperature of 150 deg. F., dependent on ambient temperature conditions and the degree of moisture to be evaporated. The primary heater has a loading of 90 kW (three 3-phase banks of 30 kW), while the secondary heater is of 66 kW (three banks of 22 kW). Both heaters are thermostatically controlled through contactors by three-step thermostats mounted in the air duct, and an excess cut-out is provided.

During the actual drying period it is likely that the dryer will have to be in constant operation for twenty-four hours daily and, therefore, its load factor will be extremely high. It is, of course, an off-peak load and should the farmer wish to dry during the peak load months, it is done with the consent of, and at a time convenient to, the Electricity Department. This is quite easy to arrange, especially as the supply for the drying plant is taken through a separate e.h.v. switch and transformer under the control of the Department. The supply is switched out at the end of the drying season to save transformer losses.

The above characteristics should be borne in mind when compiling the tariff for this class of load. If tariffs are too high, or if undertakings demand a high capital contribution for the installation of a transformer

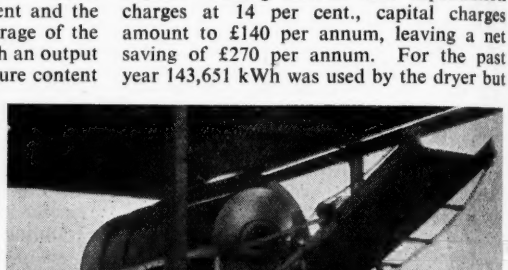


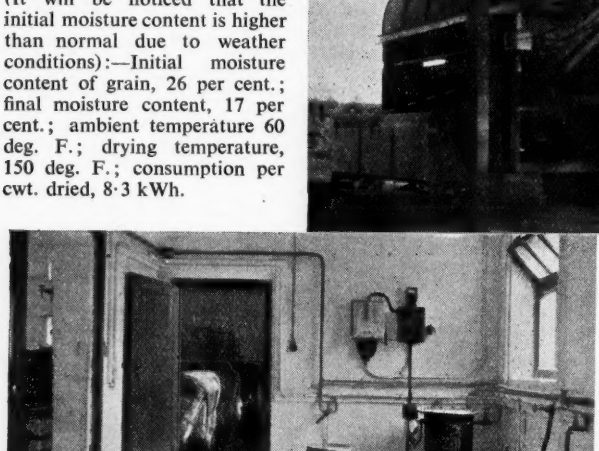
Excellent results have been obtained by the use of this electrically heated grain dryer

* When this article was written Mr. Parkinson and Mr. Tomlinson were respectively deputy engineer and consumers' engineer at St. Helens. Recently Mr. Parkinson has been appointed engineer and manager of the Leigh (Lancs) Corporation Electricity Department.

and cable, the total cost involved is likely to be such as to kill the job at the outset. This would be a great pity as the load is worth encouraging and capable of considerable development.

The consumption varies in direct proportion to the moisture content and the ambient temperature, but an average of the results obtained indicates that with an output of one ton per hour, initial moisture content 22 per cent., final moisture content 16 per cent., ambient temperature 60 deg. F., the consumption per cwt. is approximately 5 kWh. The following are details of an actual crop of wheat taken from a 14-acre field. (It will be noticed that the initial moisture content is higher than normal due to weather conditions):—Initial moisture content of grain, 26 per cent.; final moisture content, 17 per cent.; ambient temperature 60 deg. F.; drying temperature, 150 deg. F.; consumption per cwt. dried, 8·3 kWh.





Above: This pea viner saves approximately nine-tenths of the labour required by older methods Left: A view of the dairy showing the electrode boiler

A comparison of running costs of self-binding against combining shows:—

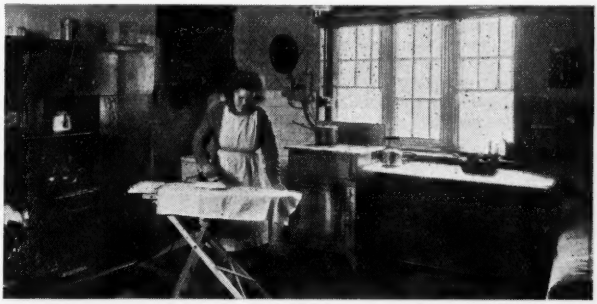
	Self Binding	*Combining*
	£ s. d.	£ s. d.
Labour	36 0 0	8 0 0
Fuel oil and grease ..	4 15 0	3 10 0
String	5 0 0	nil
Electricity	nil	8 6 8
Thrashing, including coal	22 0 0	nil
	£67 15 0	£19 16 8

The saving in running costs in favour of combining is £47 18s. 4d. The total acreage under grain is approximately 120, representing a total annual saving of £410. The increased capital cost in purchasing the combine and grain dryer and deducting credit value for the sale of self-binders, works out at about £1,000. Taking interest and depreciation charges at 14 per cent., capital charges amount to £140 per annum, leaving a net saving of £270 per annum. For the past year 143,651 kWh was used by the dryer but this high consumption was due to 2,000 tons of grain being dried for the Ministry of Food.

Whilst the cost of drying grain electrically may be higher than is the case with coke, drying costs as a whole form a relatively small proportion of the total production costs (3d. to 6d. per cwt., depending on the price per kWh and the moisture content). The farmer, however, not only recovers the increased costs in the price he obtains for his product, but the increased capital charges are more than met by his considerable saving in overall costs in getting his crop in—this, apart from the time factor and possible loss due to inclement weather with the older method.

In the case of grain grown for seed purposes very accurate control of the drying temperature is necessary if the germination

value of the seed is not to be lowered or destroyed. Last year the seed merchants insisted that a particular field grown under contract for them should be self-bound, allowed to dry naturally and thrashed. They have now been convinced, however, that the accurate air temperature control possible with the electrically heated grain-dryer eliminates any possibility of destroying the germination value of the grain dried and this year's harvest has therefore been combined and dried in the grain-dryer.



Electricity is used extensively in the kitchen and other farm buildings

A new Mather & Platt pea viner recently installed at the farm is capable of vining a 5-acre field in about eight hours with the employment of fifteen men as against approximately 160 pea pickers under the older method; furthermore, labour and machinery for shelling are saved at the factory end. Employing this machine, the whole pea vine is fed on to an elevator and is conveyed to beating drums which shell the peas and deliver them into a series of hoppers for automatic boxing. The pea vines, passing out of the machine *via* a separate elevator, are used for making silage. The viner is driven by a 17-HP slip-ring motor which last season used 1,054 kWh.

Dairy Equipment

In the dairy an Alfa-Laval, 4-unit, auto-recorder, electrically-operated milking plant, with a ¾-HP motor, is capable of milking forty cows per hour on the bale system. A Bastian & Allen 20-kW electrode boiler, besides providing the steam necessary for sterilising the above milking equipment, also gives hot water for washing purposes. For a herd of eighty milk cows, producing 57,000 gallons, the consumption averages 8,000 kWh per annum, equal to 0·14 kWh per gallon, or 22 kWh per sterilisation.

For lighting the farm buildings 1,318 kWh was used last year, while water pumping (3½-HP motor), grinding and chopping (12½-HP motor), elevating, potato riddling, seed dressing, etc. (2-HP portable motor) accounted for 2,738 kWh. A further 8,528 kWh was required in the farmhouse for a large domestic cooker, water-heater, washing machine, refrigerator, vacuum cleaner, radiators, etc.

We are indebted to Mr. P. Bregazzi, engineer and manager of the St. Helens Electricity Department, and to J. Heyes & Son for permission to publish this article and for their assistance.

Developments in Queensland

THE eighth annual report of the State Electricity Commission of Queensland records the progress made with the reorganisation of the industry and outlines development plans. A general framework of development has been mapped out for the whole State, sites have been chosen for new generating stations to serve the Townsville and Wide Bay Regions and a site is being investigated for a station for the Capricornia Region; and complete investigations for a programme of development have been carried out in the Wide Bay, Townsville and Cairns Regions. Under the Regional Electric Authorities Act the State may be divided into a number of Regions, each under the control of a Regional Electricity Board; two such Boards have so far been constituted, Wide Bay and Cairns. One function of the Boards under the Act is trading in electrical equipment. The rights of privately owned electricity undertakings are preserved by their exclusion from any Region until purchased.

The loan proposals of public electricity undertakings for 1945-46 amount to £2,257,095, with provision for an actual expenditure of £613,040 during the period. Major works included in the National Works Council's post-war reconstruction programme, extending over two years, embracing the erection of new power houses at Maryborough, Rockhampton and Townsville (£1,430,000); development in various Regions (£1,038,020); preliminary expenditure at Tully Falls and other hydro-electric projects (£150,000); and expansion in other centres (£81,980).

Views on the News

Reflections on Current Topics

ALTHOUGH we finally proved better than the Germans in scientific warfare they possessed a good deal of knowledge and experience different from, and perhaps sometimes in advance of, ours. That is why we are now sending parties of scientists and industrialists to visit German laboratories and works. Already, as a result, a number of useful reports have been published. Some of these, such as those dealing with the production of synthetic mica and rubber, possess some electrical interest, but so far there have been no purely electrical reports. I am told that about a dozen parties of electrical men have been across to inspect German establishments, but it takes a little time to prepare and print reports. When they do appear there should be some interesting reading.

* * *

In many respects Burma is an awkward place to be in. For instance if you start out from scratch to study electricity a ship's library is not likely to be very helpful and searches during occasional shore leave will probably be entirely fruitless. This is the plight of a signalman in the Navy who (with some of his shipmates) is anxious to do something to equip himself for civilian life. He writes asking if readers have any finished-with text books, etc., which they could let him have. If such there be I shall be glad to pass them on to him—or if readers would prefer to do it directly I can let them have my correspondent's name and ship.

* * *

The problem, raised by Mr. E. H. Shephard in the *Electrical Review* last week, of recovery by retailers of purchase tax on goods on which the tax has been reduced or removed entirely is likely to cause a good deal of unfairness and uncertainty, not to mention annoyance, to retailers, especially as greater supplies of goods become available. At the moment with the still small numbers of goods on the market a prospective purchaser is not so likely to dispute the inclusion of the tax as when he is offered the choice of the newer tax-free articles of almost certainly better quality. It is unreasonable to expect either the customer to be willing to pay the tax or the retailer to forgo it. The situation is one which is certain to get worse as the tax is reduced or removed from more and more items, and retailers are not likely to be particularly anxious to place orders, at any rate before next Budget Day, for such articles as electric kettles which must surely be foremost in consideration for tax removal. Prior notice to the trade of tax modifications (which has been given in two recent cases but was not when the tax was removed from heating and cooking apparatus, etc.) might or might not help matters in the future, but in any case it would not seem beyond the ingenuity of the Treasury and the Board of Trade to devise some machinery for retailers to recover tax already paid by them. The problem is of course not confined to the electrical industry, but it appears to be a matter in which B.E.A.M.A. and the Fair Trading Council must be vitally interested.

* * *

Low gas pressure during the recent cold spells has provided an apparently very necessary warning to the Government that deficiencies in coal supplied are not the most immediate factors that are causing anxiety to the operators of public utilities. The present situation was foreseen by the gas industry as likely to arise from insufficiency of labour. Additional labour provided at the last moment—much below the minimum number needed to ensure stability—will have to be trained, and the subsequent improvement is no doubt attributable to milder weather. In regard to electricity supply, last winter less than half the additional labour required for adequate maintenance had been made available (after strong representations to the authorities) with the consequence that on critical occasions the amount of plant out of commission was more than four times the pre-war average.

* * *

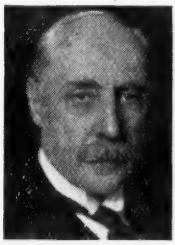
Earlier reports from the United States gave the impression that the reconversion process there was going ahead more smoothly and rapidly than in this country. These seem to have been too optimistic for more recent news is of widespread labour troubles which are holding up some of the largest of American industries. Among the latest stoppages is that of over 17,000 employees of the Western Electric Co. accompanied by the threat of a sympathetic strike by 450,000 workers employed by the Bell Telephone System. The United Electrical Workers' Union has fixed January 15th as the date for a strike of 200,000 people to enforce a demand for a 30 per cent. wage increase. In a national address last week President Truman blamed Congress for the slow pace of reconversion by its hesitation to give legislative approval to the proposed "fact-finding" boards for industry and other proposals designed to give a "square deal" to industrial workers.—

REFLECTOR.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IN dealing with the New Year Honours last week we regret that we overlooked the fact that **Mr. Colin F. Campbell,** chairman of the London Clearing Bank and the National Provincial Bank, upon whom a barony is conferred, is also chairman of the Telegraph Construction & Maintenance Co., Ltd. The new peer's portrait is reproduced with this note.



Mr. Colin F. Campbell

A knighthood was conferred upon Mr. F. J. E. Brake, M.I.E.E., controller of construction and regional services, M.A.P.

In the lists of military awards of New Year Honours there appeared the names of the following corporate members of the Institution of Electrical Engineers: O.B.E.—Col. A. G. McDonald (R.E.M.E.) and Lt.-Col. H. B. Somerville (Royal Signals). M.B.E.—Major H. Birchenhough (R.E.M.E.), Major H. Dudley (Royal Signals), Lt.-Col. H. A. Lewis (R.E.M.E.) and Major E. P. Stanton (Royal Signals).

Air Commodore G. W. P. Grant, who recently joined Vactric, Ltd., was made a C.B.E. (Mil.)

Lt.-Col. A. J. Macphail, who receives the O.B.E. (Mil.), was publicity manager to British Insulated Cables, Ltd., before the war.

The second part of the New Year Honours List was published on Wednesday. A list of the names of electrical interest will appear in next week's issue.

Mr. J. W. Blakemore is to retire from the position of general manager of the Salford Corporation Transport Department.

Mr. H. A. Harding, A.M.I.E.E., has retired from the position of electrical engineer to the Bognor and District Gas & Electricity Co., which he has held since the commencement of the company thirty-two years ago.

Group-Captain C. E. H. Verity, O.B.E., has returned to the staff of the London Power Co., Ltd., from which he was seconded by the Air Ministry early in the war, and has been appointed chief development and testing engineer (mechanical engineering).

Squadron-Leader Andrew Bailes has returned to his pre-war position as sales engineer for the North-East area for Belling & Co., Ltd., after five years in the R.A.F.

Mr. C. L. Railton, A.M.I.E.E., A.M.Inst.W., of the Ministry of Supply Advisory Service on Welding, has been released to take up an appointment with the Research Department of the Tube Investments group. Previously on the welding staff of the Metropolitan-Vickers Electrical Co., Ltd., Manchester, Mr. Railton has for the past five years been associated with the Armaments Design Department as adviser on welding.

Col. E. Gore-Browne, chairman of the Southern Railway Co., has been appointed a member of the Central Electricity Board by the Minister of Fuel and Power, in the place of **Sir Ralph Wedgwood** whose third five-year term of office has expired.

Mr. R. Kelf-Cohen, a principal assistant secretary in the Ministry of Fuel and Power has been appointed an under-secretary. He remains in charge of the Gas and Electricity Division.

Lt.-Col. Dennis Bellamy, O.B.E., has been appointed a Deputy Lieutenant of the East Riding and of the City and County of Kingston-upon-Hull. Col. Bellamy is the general manager of Hull Corporation's electricity undertaking. He was prominently associated with the Home Guard during the war.

Mr. H. W. Heyman, B.Sc. (Hons.) Electrical Engineering, Birmingham University, until lately chief engineer of the Battery Electric Vehicle Department of the Brush Electrical Engineering co., Ltd., has joined Northern Coachbuilders, Ltd., makers of the "N.C.B." battery electric vehicle. Mr. Heyman served his apprenticeship with the A.E.G. in Berlin and afterwards went to Electricars, Ltd., at Birmingham. Later he joined the Metropolitan-Vickers Electrical Co., Ltd., and transferred to the Brush Company when it acquired the "Metrovick" electric vehicle business.

Mr. H. W. Heyman

Mr. J. S. Wills has been appointed managing director of the British Electric Traction Co., Ltd.

Mr. H. Waddington, joint managing director of Gent & Co., Ltd., who joined the company as an apprentice in 1895 at the age of fifteen, retired on December 31st. He was appointed works manager in 1903 and joined the board of directors in 1917. He became assistant managing director in 1933 and three years later joint managing director with the late Mr. I. Hardy Parsons. After Mr. Hardy Parsons' death **Mr. H. Kelvin Parsons** was appointed joint

managing director and the latter will now assume the full managing directorship. With the retirement of Mr. Waddington comes news of the appointment to the board of **Mr. O. E. Kinsey,** secretary; **Mr. R. Swift,** works manager; and **Mr. L. Pywell,** London office manager.

Sir George E. Bailey, C.B.E., managing director of Associated Electrical Industries, Ltd., and chairman of the Metropolitan-Vickers Electrical Co., Ltd., has joined the board of the Micanite & Insulators Co., Ltd.

We reproduce herewith the portrait of **Mr. J. Harwood Fryer** who, as was reported last week, has been appointed to the board of Crompton Parkinson, Ltd., and becomes a joint managing director of the company. He is succeeded as secretary by Mr. H. Fawcett.

Mr. J. Harwood Fryer

Mr. D. A. Dewison, A.M.C.T., Graduate I.E.E., has left the Engineering Department of I.C.I., Alkali Division, to become an assistant electrical engineer on the London staff of Merz & Maclellan.

York Corporation Electricity Committee recommends the appointment of **Mr. W. A. Crocker,** deputy borough electrical engineer, Birkenhead, as city electrical engineer.

Mr. S. H. Parsonage, A.M.I.E.E., has resigned the managership of Compound Electro Metals, Ltd., for whom, however, he continues to act in an advisory capacity. His new work concerns, among other things, economic forms of electric heating and the engineering application of dense, high-melting-point materials. His address is 42, Pall Mall, S.W.1.

Mr. William Ross, who went to South Africa fifteen years ago when Mavor & Coulson's subsidiary company was formed, has been home discussing future developments. He has been appointed a director of Mavor & Coulson, Ltd.

Mr. Ian W. D. Macdougall, on return from service in the Navy, is to be secretary of Mavor & Coulson (S.A.), Ltd., and he, too, has been invited to join the board.

Sir Thomas Gardiner, G.B.E., K.C.B., Director General of the Post Office since 1936, has retired after nearly forty years' service with the G.P.O. From 1939 to 1940 he was Secretary to the Ministry of Home Security.

The following re-arrangement of staff of the Liverpool Electric Supply Department has taken place:—**Mr. J. E. Dale,** second electrical assistant, becomes sales and service superintendent; **Mr. G. J. Bulmer,** domestic heating assistant, becomes assistant sales and service superintendent, and **Mr. J. M. Cowan,** temporary assistant, second electrical assistant. **Mr. W. B. Parkinson,** district h.v. inspector, is now designed assistant engineer, distribution. **Mr. A. Wilkinson,** relief staff engineer, has been appointed to succeed the late Mr. C. W. Bostock as boiler house superintendent at Clarence Dock power station.

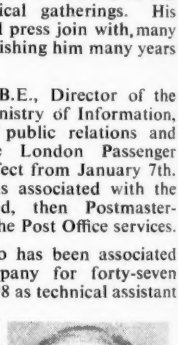
The Liverpool Electric Power and Lighting Committee is to invite applications for the appointment of deputy city lighting engineer at a commencing salary of £700 per annum.

Sir George Nelson, chairman and managing director of the English Electric Co., Ltd., has been elected a member of the Technical Committee of Lloyd's Register of Shipping.

Mr. F. W. Warner, who has been with the *Electrical Times* for about thirty years, retired at the end of 1945. He had been in journalism for well over fifty years. During his time with our contemporary he became a well-known and popular figure at electrical gatherings. His colleagues of the electrical press join with many others in the industry in wishing him many years of happy retirement.

Mr. J. H. Brebner, O.B.E., Director of the News Division of the Ministry of Information, has been appointed chief public relations and publicity officer of the London Passenger Transport Board, with effect from January 7th. In 1931 Mr. Brebner was associated with the late Sir Kingsley Wood, then Postmaster-General, in popularising the Post Office services.

Mr. C. E. Rickard, who has been associated with the Marconi Company for forty-seven years, having joined in 1898 as technical assistant to the late Marchese Marconi, retired from the position of general manager at the end of last year. By reason of the official positions he has held and of his attendance at international conferences, Mr. Rickard has been a well-known figure in wireless circles and he will be greatly missed from the day-to-day affairs of wireless administration. He was intimately concerned in all the early experimental work and demonstrations given by the Marconi Company to British and foreign Governments. In 1904 he went on a mission to the Chilean Navy which lasted for a number of years, during which he held the rank of commander. He was awarded the O.B.E. for valuable services to H.M. Navy during the 19141-8 war.



Mr. C. E. Rickard

On returning to England in 1919 he took up his work as assistant to Mr. Andrew Gray, engineer-in-chief of the Marconi Company, and held successively the posts of deputy engineer-in-chief, engineer-in-chief, technical general

manager and acting deputy managing director. Having reached retiring age he left the company at the end of 1939, but returned in January, 1941, to help with the war effort as general manager of the company, a position which he held until his final retirement. In 1930 he acted as adviser on radio matters to the Russian Government and in the same year was elected chairman of the Radio Section of the I.E.E.

Mr. A. L. Higson, hitherto attached to the Manchester branch of Philips Lamps, Ltd., has been appointed manager of the Birmingham branch to succeed **Mr. J. B. Britton,** who is retiring from the position after twenty-one years' service.

Mr. A. L. Higson

Mr. B. P. Hutton, who before the war was Birmingham branch manager of Marryat & Scott, Ltd., has returned to the company as sales manager, at London. **Mr. C. G. Reeks,** who was on the London technical staff and who was immediately before the war in the Cairo office, has also rejoined the company as South Western representative at 107, St. George's Road, Cheltenham, Gloucestershire (telephone: Cheltenham 52278). **Mr. H. L. Nathan** has been appointed South Coast representative with headquarters at Royal Insurance Buildings, North Street, Brighton, 1.

Mr. C. L. Forbes has joined the board of Greenwood & Batley, Ltd.

Mr. C. H. Bunclark, B.Sc., has been appointed a director of the Franki Compressed Pile Co., Ltd.

Mr. J. S. Rogers has been appointed assistant manager of the Leeds branch of Brown Brothers, Ltd. Mr. Rogers joined the company many years ago and has had experience in both the Newcastle and Leeds branches. In recent years he has operated as representative in Leeds and in the West Riding.

Mr. P. Cannon has retired from the position of superintendent of the Instrument Making Department of Muirhead & Co., Ltd. At a gathering on December 28th Mr. A. L. Muirhead, chairman of the company, thanked Mr. Cannon for his fifty-three years' service and presented him with cheques from the company and the staff.

Mr. J. B. McRostie, B.Sc. (Eng.), A.M.I.E.E., has been appointed sales manager of Johnson & Phillips, Ltd., with headquarters at Columbia House, Aldwych. His activities will cover the marketing and distribution of the whole of the company's products in the home territory.

Mr. S. C. Middleton has been appointed as sales representative for Hugh J. Scott & Co. (Belfast), Ltd., in the Midlands. Mr. Middleton has had much experience as an electrical engineer having been on the staff of the General Electric Co., Ltd. For the past 8½ years he has been Midland sales manager for Bull Motors.

Mr. W. G. Stevens, chief cashier of the General Electric Co., Ltd., and **Mr. S. F. Thomas,** the chief accountant, retired at the end of 1945. Both Mr. Stevens and Mr. Thomas have sons in the company.

Mr. G. E. Mason, for many years a director of the Lancashire Dynamo & Crypto, Ltd., recently retired after forty-six years' service. During recent years Mr. Mason has been in charge of the company's Leeds office where **Mr. A. J. Beanland** now succeeds him as manager. At the company's Trafford Park Works, Mr. J. H. Dunbar (director), on behalf of the directors and employees of the company presented a silver salver to Mr. Mason.

Mr. P. E. Simmonds, A.M.I.E.E., at present on the mains construction staff of the Yorkshire Electric Power Co. has been appointed technical sales representative for the North of England, with Gresham Transformers, Ltd. He was previously on the mains staff of the Leicestershire & Warwickshire Power Co. and Blackpool Corporation Electricity Department. He takes up his new duties on February 1st.

At a Christmas dinner given by the directors to the employees of Dorman & Smith, Ltd., presentations were made by Mr. T. Atherton (managing director) and Mr. T. Smalley (works manager) to **Mr. Arthur Whitehead,** the third of three brothers to serve more than fifty years with the company.

Mr. T. Atherton presenting a silver salver to Mr. A. Whitehead

Obituary

Mr. R. H. Briggs.—We regret to report the death on January 3rd of Mr. Roland Hunter Briggs, M.B.E., M.I.Mech.E., who during the war was assistant director of the Technical Press Censorship. Although editors were very much circumscribed by censorship they found Mr. Briggs always helpful and willing to interpret

the rules as leniently as possible, consistent with security. At the time of his death he was editor of the *Overseas Engineer.*

Flight-Lieut. T. A. Andrews.—We are sorry to hear from Mr. E. Andrews, electrical engineer and manager to the Mexborough U.D.C. that he has been notified that his son Flight-Lieut. Trevor Aubrey Andrews (22) previously reported " missing, believed killed " lost his life on December 1st, 1945, during air operations against Indonesian strongpoints. His body was recovered by Japanese and is interred at Bandoeng, Java.

Mr. J. H. Parker.—Many readers will learn with regret that Mr. John Hampden Parker, who had just retired from the position of chief electrical engineer to the London Passenger Transport Board, on account of ill-health, died on January 4th. Mr. Parker was educated at the Royal Technical College, Glasgow, and served an apprenticeship with Alley & McLellan. He entered the Greenock Electricity Department in 1904 as a draughtsman and rose to be chief assistant electrical engineer. In 1915 he went to Croydon as deputy electrical engineer. He left Croydon in 1925 to become borough electrical engineer of West Hartlepool and was later also appointed manager of the Transport Department, in which capacity he was responsible for the conversion of the system from trams to trolley-buses.

The late Mr. J. H. Parker

Later Mr. Parker joined the L.C.C. Tramways as electrical engineer and when the L.P.T.B. took the system over in 1930 he continued as electrical engineer (tramways) subsequently becoming electrical engineer (distribution) and, in 1939, chief electrical engineer.

Mr. Parker was president of the Associated Municipal Electrical Engineers in 1935-36 and he was president of the Electrical Power Engineers' Association when the N.J.B. salary schedule was negotiated and applied.

Mr. C. E. Linnell.—News has recently been received of the death in hospital in Bombay of Mr. C. E. Linnell at the age of thirty-three. Mr. Linnell had been an assistant mains engineer in the St. Helens Corporation Electricity Department since 1937, having previously served with the Portsmouth undertaking. In 1940 he was transferred to the Civilian Section of the Admiralty as a research scientist.

Mr. J. W. Bertram.—We regret to learn of the death on December 12th, at Perth Military Hospital, Western Australia, of Mr. John William Bertram, of the China Light & Power Co., Ltd., Hongkong.

Technicians for the Mines

THERE has just been issued a report upon plans for recruitment, education and training in the coal mining industry prepared by Dr. R. W. Evans in conjunction with the Recruitment, Education and Training Committee of the Mining Association of Great Britain. In the course of this reference is made to both electrical craftsmen and higher technical officers. Approval is expressed of the proposal of the Association of Mining Electrical and Mechanical Engineers to offer a craftsman's certificate to an apprentice who is able to prove that he has satisfactorily completed three or four years of directed training. From such apprentices outstanding boys would be selected for further training, possibly of university standard, with a view to making them group engineers.

This would be one method of recruitment for the ranks of the technical specialists the other being to take suitable young men from the secondary schools for training. As regards the state recognition of professional qualifications, the report endorses the opinion of the Royal Commission which reported in 1938 that if the A.M.E.E. was able to propose a scheme considered satisfactory by the (then) Mines Department it saw no reason why it should not be accepted as a substitute for State examination—a system which did not seem to be wholly suitable for dealing with technical matters.

The proposals include one that adequate payment should be made during the training period.

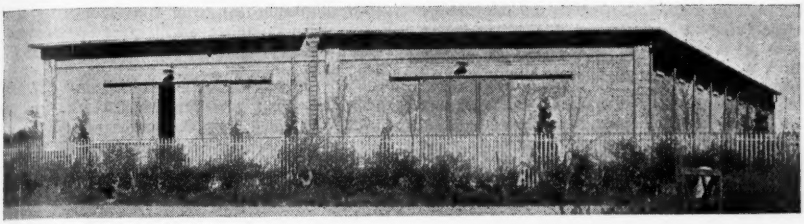
Radiolocation Convention

SPECIAL methods are being arranged to cope with the full flow of technical papers expected to be submitted to the Institution of Electrical Engineers upon the release of information hitherto classed as " secret," with particular respect to subjects within the scope of the Radio Section. It has been decided that the most effective course will be to arrange for their reading at a three-day Radiolocation Convention, to be held in the spring, with morning, afternoon and evening sessions.

A general introductory lecture will be followed by a series of integrating papers, each summarising developments in a particular branch, which will in turn precede a series of individual specialised contributions. A similar procedure may be followed in respect of other subjects, for example, the degaussing of ships as a precaution against magnetic mines.

Engineers' Memorial Service

It is announced that the three senior engineering institutions are arranging a memorial service to professional engineers who lost their lives in the war, to be held at Westminster Abbey at noon on February 21st. Arrangements for the issue of tickets are to be announced later this month.

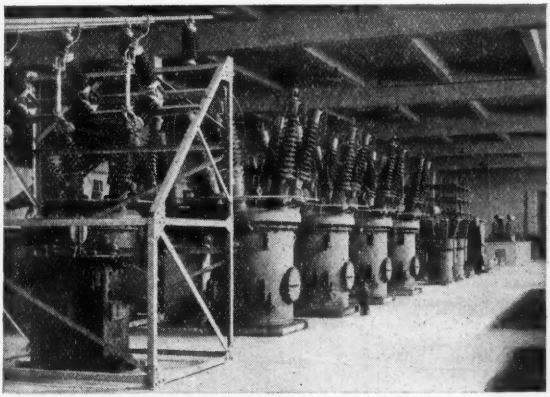


Maintaining the Supply

Establishment and Operation of the National Pool

TWO years before war broke out consideration was given to means of maintaining electricity supply in the event of enemy attack, by a special committee of the industry called by the Electricity Commissioners. As a result of these deliberations measures were devised for the protection of generating and other plant and it was decided to establish an emergency pool of plant, mainly transformers and switchgear, to enable supply to be rapidly restored when existing plant was put out of action.

Clause 42 of the 1939 Civil Defence Act empowered the Central Electricity Board to make the necessary arrangements for this. The cost was to be shared equally between the Treasury and the supply industry, the latter paying a levy imposed by the Commissioners. The establishment of the pool was placed in the hands of the Board as "trustees" for the industry.



Some of the stored switchgear: 66 and 33-kV oil circuit-breakers

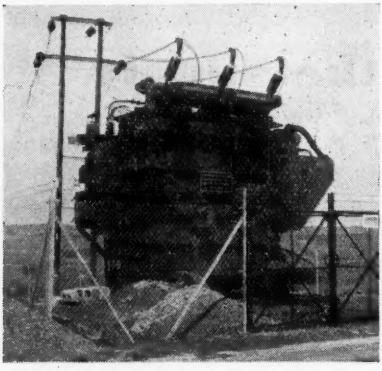
When war was declared more than 90 per cent. of the emergency equipment was ready for service. It was distributed at suitable points, thirteen special stores being erected for the purpose (one of which is illustrated in the heading block): four in S.E. England, three in N.W. England, two in Central England and one each in Scotland, N.E. England, Mid-East England and S.W. England. It comprised 94 transformers ranging from 5,000 to 30,000 kVA and the following switchgear:—200 sets for 11 kV and under; 100 sets for between 11 and 33 kV; and 50 sets for 66 V. There were also 118 miles of single-core cables for up to 66 kV, with joints and fittings, and equipment for 39 miles of temporary overhead 132-kV lines. A good deal of ancillary equipment included temporary lighting sets and handling gear.

All the stores are on the same plan though varying in length from 150 to 270 ft. The standard bays which comprise them are 22 ft. high, 30 ft. long and 50 ft. wide and the construction meets all A.R.P. requirements. There are heavy, wide end doors to enable the road transporters to enter at one end, pick up the load and pass out at the other end. All the heaviest plant is already mounted at the correct height on timber baulks to enable it to be jacked on to the lorries. Equipment weighing up to six or seven tons is handled by a Ransomes & Rapier mobile crane. The total capital cost of equipment and the stores was over £2,000,000.

The sizes and types of transformers were selected after a census of installed transformers had been taken by the Commissioners. They were designed with a view to easy transportation and erection. To reduce the total height the h.v. bushings were placed at the end of the transformer and arrangements were made for the dismantling of bushes if necessary without affecting the oil in the main transformer. Actually no damage occurred to

bushings during transport or from anti-aircraft debris after installation. Transformers of 10,000 kVA or below are self cooled; above this rating they have OFB cooling. Auxiliary transformers for local 400-V three-phase supplies are embodied in the design. Other features facilitate installation and emergency operation.

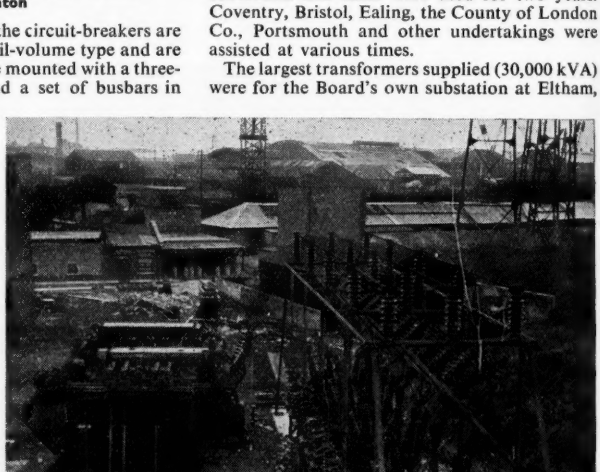
Rapid erection is also provided for in the design of the switchgear although the general



A 20,000-kVA, 33-kV transformer installed at Brighton

details are standard. All the circuit-breakers are of the three-phase, large-oil-volume type and are spring operated. They are mounted with a three-phase isolating switch and a set of busbars in an easily erected galvanised steel structure. A separate line termination structure for overhead or underground connections is provided. Inside this are accommodated auxiliary and potential transformers.

All the cables are single-core, lead-covered and hessian served and special temporary joints were provided. Overhead line equipment was also devised with a view to rapid erection. For 132-kV lines the structures were arranged for erection on base plates with guy wires, to obviate the digging of holes.



Four bays of 66-kV switchgear (later increased to five) and two 20,000-kVA transformers erected at West Ham

An admirable feature of the scheme was the provision of complete ancillary equipment and tools the absence of any of which was likely to cause serious delays.

While the pool was called upon mainly for the restoration of supplies interrupted by the enemy it was also used on occasion for remedying a " normal " breakdown or for the rapid provision of urgent supplies, particularly for munitions production. At a Press inspection of the store at Chiddingfold, Surrey, last week Mr. J. Hacking, the Central Board's chief engineer, assisted by Mr. C. F. Bolton (transmission engineer, S.E. England) and Mr. J. Longbottom (who has been responsible for the organisation), described the operation of the system and gave some details of the principal " incidents " in which it was called upon. Prominent among them was the occasion in January, 1941, when the Plymouth Corporation's station was seriously damaged and eleven bays of 11-kV switchgear were provided from the pool and erected in an adjacent road; this temporary substation was in service for a year. In March, 1941, a new turbo-alternator at Plymouth was put into service before its associated switchgear was completed by the provision of three bays of 33-kV switchgear from the pool.

At West Ham in September, 1940, five bays of 66-kV gear were put up to replace a destroyed substation and these were used for two years. Coventry, Bristol, Ealing, the County of London Co., Portsmouth and other undertakings were assisted at various times.

The largest transformers supplied (30,000 kVA) were for the Board's own substation at Eltham,

which was severely damaged in October, 1940; for Brighton; and to give urgent supplies to war factories. At other times 20,000-kVA transformers were provided for West Ham, East Ham (C.E.B.), Bristol (two), Greenock, Stafford (C.E.B.) and Brighton as well as smaller units for these and other places. Provision was made for the installation of five 132-kV and one 66-kV structures to replace damaged or destroyed towers.

Most of the leading manufacturers of transformers, switchgear and cables, participated in the provision of the equipment forming the national pool.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Stand-by Storage Batteries

THE intention of the letter from the Chloride Electric Storage Co., in the *Electrical Review* of December 28th, would appear to be to advertise storage batteries, by quoting a fragment of a sentence by the Ministry of Fuel and Power in such a way that a reasonably-minded person would infer that the original statement was wrong.

The intention of that statement must have been to disclaim ability to store the sort of energy (AC) distributed by the grid, for reissue later over the same circuits. I suggest that the Chloride Co. would never care to accept a challenge by the Ministry of Fuel to install a battery in connection with such an object, even in *any* section of an unmodified domestic-plus-industrial grid circuit, and that their letter is most misleading and unhelpful.

Bromley, Kent. R. WHEATLEY MINTER.

HAVING in mind the lack of motor generators capable of converting a comparatively low DC voltage into a three-phase 400 V or, better still, 150,000-V three-phase supply, it would be interesting to know if your correspondent's company has developed a storage battery capable of delivering a three-phase supply. If so, it is surely time that the scientific world was apprised of the fact.

Exeter. W. S. PYRAH, A.M.I.Mech.E.

Meter Testers' Status

FORMERLY employed in the meter department of a supply undertaking in the capacity of tester and repairer, I am now, after an absence of six years, about to return. Having been abroad for several years and out of contact with the meter world, I notice many changes due to wartime conditions. The chief change of these is the low rate fixed by the N.J.I.C. for meter testers and repairers in comparison with their more fortunate colleagues in other departments.

I firmly endorse the remarks of "Department Superintendent" in your issue of December 14th, in which he intimates that those responsible for fixing the rates were apparently ignorant of the duties entailed.

The second change I note is the introduction of women to fill the places of meter testers called to the Services or directed to other employment. As a result it may be thought that if women can be successfully employed as meter testers Grade I, the existing rates are justified. But I understand that generally women testers are only capable of testing and repairing single-phase meters.

While fully appreciating the efforts of women in industry during wartime conditions, I think it is only fair to meter technicians that any possible misunderstanding of the position should be removed. METER TESTER (Ex-R.E.M.E.).

Insufficiently Protected Householders

THOUSANDS of householders who have not yet experienced the conveniences of electricity in the home do not know that they are unprotected. Only Members of Parliament can ensure reasonable protection in future legislation. Sections 3 (1) and 6 (f) of the Act of 1882 have been neglected by local authorities.

Form "El.C.25" needs the addition of a demand from each supplier for a schedule of every isolated cottage, farm and village not guaranteed a supply free from subsidy and free from guarantee of revenue. Service connections on private land should not cost more than half-a-crown a yard for three cores ·0225 sq. in. insulated, lead covered, armoured; two cores are enough. Equitable terms of purchase have stood the test of fifteen years under the Northern Ireland Act of 1931. The maximum charge of half-a-crown a quarter (S.R. & O. 1944 No. 61) for unused units should be continued in future.

Herne Bay, Kent. THEODORE STEVENS.

Electrical Installations

Planning, Execution and Maintenance

HOW electrical installation work should be controlled from the inception of any scheme by the client to its completion is described by Mr. W. R. WATSON (Brian Colquhoun and Partners) in a paper submitted to the Installations Section of the Institution of Electrical Engineers. The author asks how many trades and industries utilising electrical machinery make proper use of qualified engineers for specifying installation requirements and for ensuring that proper maintenance is carried out. He points out that the Efficiency Committee of the Ministry of Fuel and Power has revealed startling facts in this connection and proceeds, in his paper, to explain why present policy falls short of requirements from the electrical engineer's point of view.

Some of the accepted methods and usages are examined in an attempt to indicate how they might be improved, or present procedure replaced by something better, in order to bring the electrical engineer into his rightful place in relation to all technical branches involved in building and civil engineering constructional work.

Discrimination Necessary

Where does the average client look for his co-ordinator? He rarely considers whether his main problem is architecture or engineering, civil or electrical, so placing upon the architect many responsibilities for which he cannot himself possess the necessary technical knowledge. That state of affairs is by no means in the interests of electrical engineers or their contractors; it does not allow them proper scope to apply their specialist knowledge or technical experience.

In the author's opinion the problem can only partly be solved by the employment of specialist engineers on the architect's staff. They can deal adequately with only a very limited number of aspects, because no single individual can claim detailed experience of all the work involved, while the employment of too many specialists would raise staff costs out of all proportion to the return.

Mr. Watson then proceeds to comment, in turn, on design and specification methods, estimating, contracting, programmes and schedules, site supervision, and final testing and commissioning of the installation. He states that if engineering consultants are brought into contact with the client at the outset, their suggestions and recommendations will help him to form a better idea of the ultimate speed and progress of the job as a whole. He cannot properly form that idea when the co-ordinator, architect, or engineer, either makes himself the only channel for the passage of all information, or uses specialist contractors as his consultants.

To obtain the best results the importance of the engineering aspects involved in almost all construction work to-day, especially electrical problems, must be properly recognised by the appointment of fully qualified engineers.

Towers for Overhead Lines

THE economics of steel towers for supporting overhead power lines are examined by Mr. P. J. RYLE (Merz & McLellan) in a paper prepared for the Transmission Section of the Institution of Electrical Engineers.

Partly from theoretical considerations, but mainly from practical data, an empirical formula has been derived for calculating the approximate weight of any tower in terms of its height and maximum working over-turning moment at the base. The tower weight above ground line is satisfactorily represented by $kH\sqrt{M}$ tons, where H is the overall tower height above ground line in feet; M is the over-turning moment at ground line in thousand lb.-ft. and k is a constant which varies within an extreme range of about 0·0014 to 0·0029 throughout the whole series of towers; most towers have k values well within this range.

The towers investigated covered ranges of about 16 to 1 in height, 3,000 to 1 in over-turning moment, and 1,200 to 1 in tower weight.

Design factors which explain variations in the constant k are discussed at some length on a qualitative basis and it is considered that an economic value for the base width of any tower is of the order of $0{\cdot}5\sqrt{M}$ ft.

On the assumption that, for any given general type of tower, the total erected cost may be regarded as proportional to the above-ground weight, the tower-weight formula $kH\sqrt{M}$ can be used with convenience and reasonable accuracy for cost estimations, especially those involving comparisons of a number of alternatives of a generally similar nature, for ordinary transmission lines as well as for navigable river crossings.

The paper concludes with an indication of the general problems that need further discussion.

COMMERCE and INDUSTRY

J.E.A. and Reinstatement Problem. November Trade Figures.

Dangerous Electrical Apparatus

At a meeting of the Blackpool Corporation Electricity Committee the borough electrical engineer (Mr. F. J. Cole) reported upon correspondence with the Board of Trade regarding certain electrical apparatus purchased by a consumer from outside the borough, which he considered was highly dangerous in use. Having regard to the limited powers of the electricity undertaking to prohibit the use of the apparatus, he requested the instructions of the Committee in the matter. The Committee decided that the town clerk should communicate with the local Members of Parliament urging that the sale of such apparatus should be prohibited by the Board of Trade and that in general there should be legislation controlling the manufacture of wholesale and retail electrical apparatus which did not satisfy standards of safety approved by the Board of Trade or the appropriate Government Department.

Service Rank and Reinstatement

At its meeting last week the London & Home Counties J.E.A. rejected a proposal that special consideration should be given to employees who had attained high rank in the Services when they returned to the Authority. It was pointed out that some of these men if reinstated in their former positions would suffer a considerable reduction in status. Mr. I. J. Hayward said that the same matter had been discussed by the L.C.C. which considered the objections to the proposed "up-rating" of these men insuperable. If the proposal were adopted they would, to be fair, have to consider what ranks some men would have attained if they had not been prisoners of war.

Imports and Exports Lower

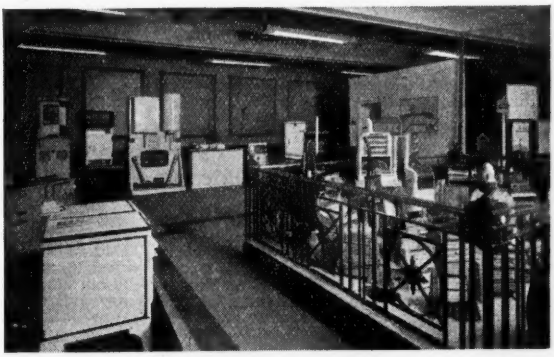
In November both exports and imports of electrical goods and apparatus were substantially lower in value, particularly the latter. This was to some extent influenced by the dock strike, which lasted until November 5th, but although the strike covered a longer period in the preceding month the value of exports in November—£890,496 — was well below the October figure. For the eleven months to the end of November the monthly average was £1,105,918; for 1944 it was £1,053,108 and for 1938, £1,119,200. Imports of electrical goods and apparatus fell to £102,211, the average for the eleven months being £1,690,581. For 1944 the average was £1,972,175 and for 1938, £258,900. Exports of machinery (all kinds, including electrical) in November aggregated £2,789,826 compared with an average of £3,618,940 for the eleven months, while the corresponding figures for imports were £750,603 and £1,752,944.

Illumination Design Course

The forty-second Illumination Design Course is to be held at the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, from February 5th to 8th. The Electric Lamp Manufacturers' Association is circularising electricity supply authorities, wholesalers, contractors and ironmongers in the London area only, but representatives of the industry from other parts of the country will be welcome. Seating accommodation at the Bureau is, however, limited and E.L.M.A. has not the staff to organise hotel arrangements. Among the topics to be dealt with are fluorescent lamps and their applications; quality control; light and colour dynamics; lighting in industry, schools and the home; the development of the electric lamp; the effects of adequate light on sight, health and standard of living; and codes of practice.

Wallasey Electrical Exhibition

A very successful electrical exhibition was held recently by the Wallasey Electricity Department. Attractive model all-electric kitchens were accompanied by examples of electrical apparatus that will shortly be available to the public. The exhibition was given a good send-off at the opening ceremony when the Mayor and Mayoress (Alderman and Mrs. W. B. Millward) were there together with Captain A. E. Marples, M.P., and members of the Council and their wives. Electricity, said the Mayor, opened up a new era in the domestic world and he hoped there would be a great increase in its use for domestic purposes. Councillor H. R. Allison, chairman of the



A section of the Wallasey electrical exhibition

Electricity Committee, said that the object of the exhibition was to bring to the notice of the public the developments there had been in electricity in the past few years. Home life would be improved by the modern kitchen equipment now available. Captain Marples declared the exhibition open and Mr. R. C. Golding, the newly appointed borough electrical engineer, thanked those who had helped to organise the display.

Electrical Equipment in "Star Light"

The General Electric Co., Ltd., was responsible for the interior cabin lighting of "Star Light," the new Lancastrian air liner of British South American Air Lines, for the design and manufacture of a special hot-cupboard in the galley and for a small electric vacuum cleaner which is the first of its kind to be developed specially for aircraft. All are designed for 24-V operation. The lighting fittings are flush-mounted and provide ample light for each passenger. The hot-cupboard has five separately-switched elements with a total loading of 750 W. The vacuum cleaner is similar to the ordinary domestic sweeper though it is somewhat smaller and much lighter.

Radiolocation Principles

A lecture on "The Scientific Principles of Radiolocation," was recently given to the English Electric (Stafford Works) Engineering Society by Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research. Sir George Nelson, chairman and managing director of the company, presided and a demonstration was arranged by Mr. A. A. Robinson and Mr. A. F. C. Sleigh of the company's Research Department.

Trade with Holland

Assistance to British manufacturers in establishing relations with Dutch business concerns is offered by the Bureau voor Handelsinlichtingen (Commercial Intelligence Office), Oudebrugsteeg 16, Amsterdam, C. The Bureau supplies overseas inquirers with addresses in Holland of manufacturers, dealers, importers, exporters and agents and puts them in touch with Dutch firms. It requires references and the refunding of the postage involved.

Non-Ferrous Scrap Metal Prices

The Minister of Supply has issued a list of prices of non-ferrous scrap metals relating to the period of three months from January 1st to March 31st. These are prices at Ministry of Supply depots at which the Minister is prepared to sell subject to having sufficient material of that particular quality available. Inquiries should be addressed to the Directorate of N.F. Metals (Scrap Disposals Dept.), Euston House, London, N.W.1 (telephone: Euston 1260). The Minister of Supply also announces revised prices for chrome ore to apply as from January 1st.

Price Control Amendments

The Minister of Supply has made the Iron and Steel (No. 46) Order, 1945, and the Control of Bolts, Nuts, etc. (No. 9) Order, 1945. The main purpose of these Orders is to provide for higher maximum prices in relation to current costs of production. The basis price of pig iron is increased by £1 a ton.

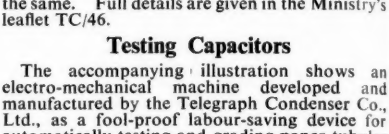
Among amendments made are the freeing of iron ore, and cinder and scale, from price control, while electrical stampings are freed from all control; all restrictions on the use of cinder and scale are raised; and restrictions on the acquisition and disposal for export of springs and certain wire products are removed.

Extra Clothing Coupons for Workers

The Board of Trade is to issue for the current rationing period ten additional clothing coupons to a wide range of manual workers in industry and agriculture. This extra ration, usually known as the "industrial ten," is similar to that given in the 1944-45 ration period, and the categories of workers eligible are substantially the same. Full details are given in the Ministry's leaflet TC/46.

Testing Capacitors

The accompanying illustration shows an electro-mechanical machine developed and manufactured by the Telegraph Condenser Co., Ltd., as a fool-proof labour-saving device for automatically testing and grading paper tubular and similar capacitors. The capacitors are loaded into channels on the belt conveyor for



Automatically testing and grading paper capacitors

transit through the machine. At the first stage, test volts are applied and failures are ejected. Sound capacitors are carried to the insulation-test stage and, if up to specification, to the capacity selection sector, where they are graded to within ± 20 per cent. or other required limits. For paper tubular capacitors involving comparatively short lengths of material, hand-winding (as against power-driven) machines have been found more efficient. The T.C.C. machine has a gear change to provide the most suitable ratio for various sizes of capacitors. Finished production is counted automatically.

Temperature Treatment

With reference to the article published under the above heading in the *Electrical Review* of December 21st, we have been asked to make it clear that the vibratory bolt feeders referred to in our description of the hardening and tempering conveyor furnaces were manufactured by G.W.B. Electric Furnaces, Ltd.

Light-Metal Organisation

The collaboration of a group of light metal manufacturers during the war for the pooling of technical information in the national interest, has resulted in the formation of a development organisation known as Alar, Ltd. (6, Old Jewry, E.C.2). The purpose of this body is first, to ensure that the present high standard of secondary aluminium alloys is maintained, and secondly, to promote their use by bringing about a wider appreciation of their properties. Under a procedure similar to that employed by the A.I.D., alloys are manufactured and in-

spected in accordance with Alar regulations, and a " release note " is issued to this effect, thus providing the user with an assurance that all the requirements of the appropriate specification have been observed. It is solely a technical organisation. Its research programme, which includes the development of new alloys, is carried out in close collaboration with other technical and research associations. An important feature is the issuing of publications bringing to the attention of present and potential users up-to-date information on the properties and applications of aluminium alloys.

Hotplate Gifts Abroad Prohibited

Electric boiling rings and boiling or heating plates are among articles which private individuals in this country may not send to private persons abroad as gifts.

Exemptions from Key Industry Duty

Under the Safeguarding of Industries (Exemption) (No. 2) Order, 1945 (S.R. & O. 1945 No. 1581), various articles are exempted from Key Industry Duty until August, 19th. Among them are arc-lamp carbons and sealed cylindrical X-ray tubes having four windows.

Swiss Fair

The 1946 Swiss Fair is to be held between May 4th and 14th in Basle.—*Reuter's Trade Service.*

Trade Publications

Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2.—Illustrated and priced leaflets descriptive of (G.T. 1345) apparatus for determining sulphur in steel by combustion and potentiometric titration; (G.T. 1346) stencil for drawing structural formulæ of organic compounds; (G.T. 1351) " Microid " flash shaker driven by a 60-W fan-cooled motor.

A.E.R. (1938), Ltd., 120, Green Lanes, Palmers Green, London, N.13. — Leaflet on electroplating on aluminium.

British Aluminium Co., Ltd., Salisbury House, London Wall, London, E.C.2.—Booklet (No. 402) containing a concise record of all current specifications for aluminium and its alloys issued by the British Standards Institution and various Government Departments.

Wright & Weaire, Ltd., High Road, Tottenham, London, N.17.—Priced and illustrated leaflet specifying the " Labpress " for experimental moulding.

Bescol (Electric), Ltd., Parkfield Road, Saltley, Birmingham, 8.—Folder No. C.21, describing the company's range of convector heaters and the " Elephant " streamlined electric kettle.

Visco Engineering Co., Ltd., Stafford Road, Croydon, Surrey.—Illustrated brochures describing (No. 458) " Sprayblast " oil coolers which extract heat by spraying water and blowing air downward over the cooling tubes and (No. 454) air filters of many kinds.

Prat-Daniel (Stanmore), Ltd., Dalston Gardens, Stanmore, Middlesex.—Illustrated leaflet (P.14) descriptive of the " Aerotec " industrial dust collector, consisting of a nest of concentric tubes held upright between top and bottom plates. Dirty air enters tangentially, whirling down the tubes and up the inner ones, throwing out the dust particles, which slide down into a hopper below.

Hoffman Manufacturing Co., Ltd., Chelmsford. —Illustrated booklet entitled " We also Helped " indicating how and where ball bearings were produced and the great variety of both civilian and military purposes for which they were used during the war.

Applicants should write on their firms' business notepaper.

Herring Freezing

Referring to the article on " Herring Freezing" which appeared in our issue of December 28th, Bowers & Barr, Ltd., inform us that they were responsible for carrying through the complete electrical wiring and switchgear installation to the specification of the chief engineer of Lever Bros. & Unilever, Ltd.

Calendars and Diaries

Bold-figured monthly sheets form the 1946 calendar of Metway Electrical Industries, Ltd., Brighton. Above them are illustrations of the company's products.

The British Vacuum Cleaner & Engineering Co., Ltd., has sent us a useful loose-leaf pocket notebook.

Mottoes are included on the daily slips of Johnson, Matthey & Co.'s calendar.

A girl warming herself in front of a Clifton electric fire illustrates the calendar of Clifton Aircraft, Ltd.

" The Wonder Shop," a picture of toymakers at work, illustrates the calendar of Fitter & Poulton, Ltd.

Trade Announcements

A. E. Southgate, Ltd., have moved to River Street, Birmingham, 5.

The London office of Laurence, Scott & Electromotors, Ltd., is now at Manfield House, Southampton Street, Strand, London, W.C.2 (telephone: Temple Bar 6777).

Simpson, Baker & Co., Ltd., have removed their Exeter branch to 4, Smythen Street.

The Transformer & Electrical Co., Ltd., is to move next month to Eastern Works, Walthamstow, E.17.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

" Sexton " domestic iron.
" Chalfont " domestic iron.
" Apex " cable protection covers

Gauge and Tool Exhibition

Importance of Correct Equipment

TOOLING-UP is not only the essential preliminary to production but also the key to a satisfactory and efficient product. British manufacturers have always depended for their popularity abroad to a very large extent on high-class workmanship. To maintain this and at the same time increase production for export, as well as for the home market, attention to the making and using of the correct tools is of greater importance than ever. To draw attention to this fact and at the same time to demonstrate the progress that has been made during the war in the production of tools and gauges an exhibition organised by the Gauge & Toolmakers' Association is now being held at the New Hall, Vincent Square, London, S.W.1.

On the ninety stands are to be seen examples of practically every type of modern production equipment now available. Besides cutting tools, drills, borers, milling machines, reamers, grinders, honers, profile grinders, chucks, moulds, tapping attachments, special optical instruments, jigs and fixtures of all kinds, there are examples of pressings, mouldings and die-castings produced with exhibitors' tools and dies, including electrical and radio components such as fuse-boxes, dials, clock cases, grid and radio towers, multi-pierced radio chassis, radio switches and valves. A machine producing an oscillating motion is of great value for testing equipment subject to vibratory working conditions. Among gauges, micrometers, comparators, interferometers, toolmakers' microscopes, etc., are an automatic sorting machine which checks multi-dimensional articles at the rate of 80 per minute and keeps a record of the numbers over and under size. The exhibition closes on January 18th.

Sea Marker Buoy

Operation of the "Jelly Fish"

INFORMATION about the "Jelly Fish" auxiliary pilot made by Ferranti, Ltd., shows the device to be a radio transmitting buoy that can be placed in position beforehand by a skilled navigator for guiding following ships, which locate its position by their radar equipment.

When the roughly cylindrical tank containing the receiver-transmitter radar gear is launched into the sea stern end first mechanical and electrical operations are automatically performed. After the buoy has sunk to a certain depth an anchor line pays out a mooring weight (pre-adjusted length) to the sea floor. The removal of this weight from the stern of the buoy restores its buoyancy. It rises to the surface and attains a horizontal position, which last action causes the aerial of the radar equipment to start telescoping to its full extent and, at the same time, move to a vertical upright position. The immersion of the buoy starts a sequence of events that are accomplished electrically, before the buoy surfaces, resulting in the connection of power supplies to the receiver-transmitter and in the buoy for self destruction.

A "sea cell" and a "corrosion cell" are mounted on the buoy and remain submerged. The former is similar to an air spaced parallel plate condenser and is connected across the l.t. supplies. As soon as sea water replaces the air electrolyte between the vanes, it becomes a conductor and current flow fuses a steel holding wire, which permits a spring-operated switch to close and relay contacts to complete the l.t. and h.t. circuits. A small subsidiary "sea cell" also passes current to relays arranged in such a way that any attempt to remove the buoy from the sea, or if it is washed ashore, will by the cessation of current cause the automatic destruction of the buoy by electrical detonation. The buoy is also destroyed, once it has fulfilled its purpose, by an action initiated by the "corrosion cell," one of whose electrodes is a silver wire gauge coated with silver chloride surrounding the other electrode, which is a steel wire for preventing a spring-operated switch from closing the detonator firing circuit. The radar equipment is operated entirely from batteries of special light weight type.

Empire Telecommunications

Exhibition at Charing Cross

UNDER the title "186,000 Miles a Second" an Empire telecommunications display was opened to the public this week by Viscount Addison (Dominions Secretary) at the Charing Cross Underground station. The exhibition is staffed by operators from the London telegraph station of Cable & Wireless, Ltd., and includes a modern high-speed telegraph circuit of the kind used to maintain overseas communications, through which visitors are able to send dummy cables; an oscillograph enables them to see their messages passing between the two ends. Other demonstrations of working equipment show how it is possible from the shore to detect the exact position of a fault in a deep-sea cable; and how cableship commanders are able to keep themselves continuously informed of the contour of the ocean-bed beneath them.

The extent and flexibility of the Empire system of wireless and cable routes is shown by a revolving globe 9 ft. in diameter and an animated map showing in several phases the development of the system in the last 80 years. There are historical exhibits and a wireless set of the kind used to maintain touch between the remoter colonies during the war by telegraphy and telephony; specimens of modern radio-photo and a graphical representation of the rise of telegraph traffic which has accompanied the progressive fall of rates are also to be seen.

Raw Material Trends

Prices, Production and Consumption in 1945

This survey, prepared for us by the Metal Information Bureau, sets out the position with regard to the leading materials used in the electrical industry during the past year, with particular reference to the effects of the cessation of war contracts.

COPPER.—The copper market experienced a very eventful year in 1945 as was perhaps inevitable with the ending of the greatest war in history. At the end of January the Ministry of Supply's wartime contracts for the purchase of raw copper ended, and whilst for a time a strong situation was maintained by a sudden expansion in American demand, the latter half of the year found producers in Canada and Rhodesia somewhat concerned regarding outlets for their production. In Canada output declined appreciably, partly owing to labour shortage and partly owing to the falling off in the demand for nickel.

With the ending of lend-lease the development of an acute shortage of dollars in Britain further complicated buying policies and purchases were concentrated on sources of supply within the sterling area. Discussions regarding the re-opening of the London Metal Exchange continue intermittently but there is as yet no certainty that the authorities will give permission for this market to resume operations. There is a very heavy demand for fabricated copper products both here and in America, but the tonnage is not up to peak wartime levels.

America has still to elucidate her policy with regard to purchases of foreign copper for 1946, and the general position at the moment is somewhat obscure in consequence. Official maximum prices in the United Kingdom remained unchanged throughout the year, but for some months they have been appreciably below world levels and the possibility of a re-alignment has been a prominent topic of discussion. World copper production this year should be adequate for all requirements, provided distribution problems can be solved.

TIN.—The whole tin picture had to be viewed from a fresh angle with the end of the Japanese war. Every effort has been made by Britain and America and the Dutch to ascertain the position of the tin mining industry in the Pacific area and to hasten a resumption of output there to meet the unfulfilled needs of the Western Hemisphere. Initial progress has been slow but the productive capacity seems to have been less seriously damaged than was anticipated, and by 1949 Malayan output should, it is estimated, be back to about 90 per cent. of the pre-war level. For the time being, however, control is having to be maintained over consumption in Britain and America and over the supplies to be made available to other countries.

A Senate Investigation Committee in the United States has made it clear that it intends to maintain the big Government-owned tin smelter (built during the war) in operation in peacetime, which is likely to have an important influence on international tin politics. The International Restriction Scheme, which has been in existence in skeleton form only during the war, is due to expire at the end of 1946, and negotiations for its renewal are expected to begin shortly. United Kingdom official prices have remained unchanged but are apparently much below actual cost as for export a figure £75 a ton higher than the internal price has been officially indicated.

LEAD.—A growing stringency in supplies characterised the lead situation during 1945, the full effect of which is only now being felt owing to the fact that both in the United States and Great Britain Government stocks of the metal were drawn upon to a considerable extent during the year. Consumption in this country broadened but is still not high in comparison with pre-war years. In the closing months of the war and the first months of reconversion cable makers experienced a quiet period, but battery production has continued throughout at a high level.

At the end of the year there was widespread expectation that United Kingdom controlled prices would be raised to bring them in line with world values, but partly owing to uncertainties regarding the 1946 supply position and partly to heavy demand the granting of licences by the Control was temporarily suspended at the end of the year. It is probable that a modest measure of restriction on consumption may be necessary in Britain and the United States during 1946 as world demand seems likely to exceed production.

It is obvious that for some time to come at any rate America will have to continue to import substantial quantities of foreign lead—a factor in the world position which was absent in pre-war years. European requirements are also likely to be larger this year than during 1945 as rehabilitation programmes there have developed rather slowly owing to marked scarcity of fuel and difficult transport conditions.

ZINC.—There have been no zinc supply problems in this country during the past twelve months, and in the United States also the trend of stocks was upwards so that at the end of the year a substantial reserve was held by the zinc industry and by the Government. Consumption in the closing months of the war showed a marked drop from the peak in this country but there was a heavy demand in America in the first quarter of 1945 owing to a sudden upward revision in the demand for brass for ammunition.

The Continent has bought some fair quantities of zinc as lack of fuel and other problems have prevented the smelting capacity there getting going again on any but a very meagre scale and further progress in this direction looks like being slow. In the United Kingdom the brass trade is very busy but total consumption is less than on a war basis and the galvanising trade is still definitely sub-normal owing to lack of labour and other shortages.

The zinc alloy die-casting industry is operating well below its wartime peak but should see more active conditions in 1946. Zinc rollers are very heavily booked. In zinc, as with other metals, the United Kingdom official price has ruled below world levels and the possibility of some adjustment is constantly borne in mind although judged by pre-war prices and the fact that there is no world scarcity of zinc the current price level seems fully to offset increased costs of production.

ALUMINIUM.—The end of the war has completely changed the situation with regard to aluminium. Even before the fighting ended it became apparent that the Allied Nations had developed excess productive capacity, and with a sharp diminution in war requirements it became evident that probably at least half the potential output would not be required. Canada, with half a million tons capacity, does not expect a peacetime demand of more than about 200,000 tons a year, and the United States Government is seeking to dispose of a number of its reduction plants.

During the year the British price was reduced from £110 to £85 a ton to bring it into line with American quotations, and under normal competitive conditions further reductions are considered by no means unlikely. This means that aluminium is now highly competitive with copper in the electrical field, and may have wider outlets for constructional purposes, the outstanding manifestation of which is, of course, its use in pre-fabricated houses. For this purpose, however, mainly secondary metal will be used, of which the authorities here have very large stocks. It can hardly be said that the aluminium industry has completely realigned itself with the changed conditions, but a big and efficient fabricating industry was developed during the war which it is hoped will be maintained during the coming years if a ready supply of the raw metal at competitive prices can be assured.

RUBBER.—There has probably never been a more eventful year for the rubber industry than that which has just ended. The liberation of Malaya and the Dutch East Indies means that supplies of natural rubber will begin to flow again from the world's major producing area, and the problem of natural *versus* synthetic rubber is now developing in a more acute form than ever before. Great Britain, no doubt for currency and other reasons, will use mainly natural rubber but the United States, which has built up a synthetic capacity approaching 1,000,000 tons a year during the war, is certain to wish to retain a large proportion of this, largely on strategic grounds.

It is too soon yet to form any opinion as to the competitive position of the two materials on a straightforward price basis in view of the increases in cost which are likely to have occurred as a result of the war. For the moment supplies of rubber in Britain remain rather scarce and may continue so for some months until a sizeable flow of shipments from the Pacific area can be got going again.

Radio-frequency Heating

THE cost of dielectric heating at radio-frequencies is given in the *Electrical World* (September 15th, 1945) as from about 1·5 to 2·4d. per kWh including maintenance and amortisation. When the resistivity of a material is below 1,000 ohms per cm., it is stated, some other technique is usually desirable. A formula for calculating the rate of heating in W is given as $1{\cdot}41\ a\ f\ E^2 e'' \times 10^{-12}$ divided by the thickness of the material in inches, where a is the area of the electrode in sq. in., f is frequency in cycles per sec., E is RMS voltage and e″ is the loss factor of the material (= e′ tan δ).

Since the amount of energy introduced into the material is proportional to the frequency, the latter is as high as possible subject to limitations. Capacitative reactance of a large area may prevent tuning of the load and the current may be too high to cope with. Length of load may produce uneven heating attributable to standing waves.

The higher the frequency the greater the probability of unequal voltage distribution over a given length or area. This effect is minimised if the longest distance from the point of connection to the edge of the high-voltage electrode is less than 0·0625 times the wave length or if the material is scanned, the variation in heating then being less than 20 per cent. over the area. The maximum frequency in megacycles per sec. required to avoid this variation is stated to be 62·5 divided by the product of this maximum distance in ft. and the specific inductive capacity of the material. It is considered undesirable on practical grounds at the moment to use frequencies over 20 megacycles for powers above 20 kW.

Power input to the material is proportional to the voltage required, but voltage between electrodes should be under 15 kV. Radio-frequencies cause puncture at much lower values than at mains power frequency, and the gradient is desirably below 2 kV per in. in porous material and 5 kV in other cases. A lower limit to the loss factor of suitable materials appears to be between 0·005 and 0·01.

ELECTRICITY SUPPLY

Belfast Contracts. West Midlands Borrowing Powers.

Belfast.—CONTRACTS FOR PLANT.—The Electricity Committee has recommended the purchase of plant to the value of over £750,000 from the Stirling Boiler Co., and the Metropolitan-Vickers Electrical Co. The plant is to be in operation in 1948.

Blackpool.—OFFICES AND SHOWROOMS.—The Electricity Committee has requested the borough electrical engineer to prepare a scheme for the erection of permanent central office and showroom accommodation and in the meantime to negotiate for temporary showrooms.

Coventry.—PRIMARY SUBSTATION.—The Electricity Committee is to provide a primary substation in the Whitley area at a cost of £91,451.

Croydon.—NEW SUPPLIES.—The Electricity Committee is to erect a substation at West Croydon and at the same time provide a supply to E. H. Smith (Croydon), Ltd., at Wellesley Road at a cost of £4,896.

Darlington.—COAL-HANDLING PLANT.—The Town Council has applied for sanction to borrow £10,000 for purchasing land and providing coal-handling facilities for the Electricity Department at East Mount.

Hull.—CHOICE OF SERVICE.—The Housing Committee has asked the city treasurer to take a referendum of a proportion of the applicants for houses to determine whether they would prefer electricity or gas for cookers and wash boilers.

LOANS.—Sanction has been obtained by the Electricity Committee to borrow £50,000 for mains and services, £42,500 for the cooker hiring scheme, and £25,000 for the water heating scheme.

Lancaster.—RURAL ELECTRIFICATION PLANS.—The Electricity Committee aims to complete the electrification of the whole of the rural area for which it is responsible within a comparatively short time. At the last meeting of the City Council Alderman J. L. Dirkin, chairman of the Electricity Committee, referring to the scheme submitted by the electrical engineer (Major G. C. Milnes) and estimated to cost £31,353, said it was proposed to develop one of the few remaining parts of the area. The present proposals would add another 25 miles of cable and this would leave between 30 and 40 miles still to lay to electrify the whole district.

Macclesfield.—EXTENSIONS TO STORES DEPARTMENT.—The Electricity Committee proposes to purchase a block of property behind the electricity showrooms in Mill Street for £2,900. The property is required for prospective extensions to the stores department of the electricity undertaking.

Middlesbrough.—METERS.—Application is being made by the Town Council to borrow £2,000 for meters.

Rotherham.—MEETING INDUSTRIAL DEMAND.—The Electricity Committee is to reinforce the cable network and extend the Templeborough substation at a cost of £35,000 to meet the demands of industrial consumers.

Salford.—POWER STATION EXTENSIONS.—The City Council at its last meeting referred back a proposal of the Light, Heat and Power Committee to have the electrical and mechanical works at the Agecroft power station undertaken by the city electrical engineer and his staff and to pay them £25,000 for their services. Councillors who objected to the proposal questioned whether the officials could supervise a £4,500,000 scheme in their spare time and pointed out that this £25,000 paid over a period of five years would rank for superannuation. While the city electrical engineer and his deputy agreed that the payments should not count for superannuation, this could not bind their heirs and successors.

LOAN FOR COOKERS.—The Light Heat and Power Committee is seeking sanction to borrow £22,500 for electric cookers.

Sheffield.—METER DEPARTMENT.—The Electricity Committee proposes to enlarge and re-equip the meter department at a cost of £4,000.

Stirling.—SUPPLY TO CREAMERY.—The burgh electrical engineer reports that the original estimate of £6,000 for an AC supply to a creamery at Burghmuir has now been considerably reduced in consequence of the purchase of the Air Ministry's hydrogen plant substation. The new estimated cost is £650 for the substation and £1,350 for cables, a total of £2,000.

Wallasey.—PROPOSED NEW PLANT.—At a meeting of the Electricity Committee the engineer reported on certain proposals to install new plant at the Poulton power station, and intimated that a further report would be submitted when the observations of the Central Electricity Board were received.

Watford. — DIFFERENTIAL CHARGES. — The Electricity Committee, having considered representations regarding charges in the areas of the Aldenham Parish Council, Watford R.D.C., Hempstead R.D.C. and Hemel Hempstead Corporation, has come to the conclusion that the time has now arrived for the abolition of all differential electricity charges.

West Midlands.—J.E.A.'s ESTIMATES.—Application is to be made to the Electricity Commissioners by the West Midlands Joint Electricity Authority for an increase in its maximum borrowing powers from £10,000,000 to £20,000,000 to cover the programme of electrical development already in hand. This was decided at a recent meeting of the Authority in Wolverhampton, when the annual estimates were considered. Mr. C. Heathcock presided. In 1945 the Authority sent out 1,000·2 million kWh at a total cost of £2,289,000, representing 0·55d. per kWh. It is estimated that in 1946 the output will be 1,040·2 million kWh, costing £2,457,000, or 0·567d. per kWh. Altogether 734,000 tons of coal were consumed in 1945, at a cost in bunkers of £1 19s. per ton. In 1946 it is estimated that the consumption of coal will total 780,000 tons, at a cost of £2 1s. per ton.

Revenue in 1945 from the sale of bulk supplies in the West Midlands was £2,326,000, representing an approximate surplus on revenue account for the year of £8,523. Estimated

revenue from bulk supplies in 1946 is £2,379,700, giving a surplus of £27,608. There is to be no change in the Authority's present charges for bulk supplies.

In the Authority's distribution area in Shropshire, the consumption for 1945 was 76,600,000 kWh, producing a revenue of £384,900, and an approximate surplus of £8,778. Estimated sales for 1946 are 79,500,000 kWh. From January 1st the charges for industrial high-voltage supplies in Shropshire were reduced by 0·04d. per kWh.

WORKERS' REPRESENTATIVE.—The Minister of Labour and National Service is to designate to the West Midlands J.E.A. the employees' organisations having members in the employment of authorised undertakers in the district, in order that the organisations so designated may choose a representative of persons employed in connection with the supply of electricity in the district to be a member of the Joint Authority. Employees' organisations wishing to be considered for designation should apply to the Secretary, Ministry of Labour and National Service, 8, St. James's Square, London, S.W.1.

TRANSPORT

Gateshead.—COUNCIL NOT TO BUY TRAMS.—No action is to be taken by the Town Council regarding a suggestion to purchase the undertaking of the Gateshead & District Tramways Co., Ltd. The Council is to meet representatives of Newcastle-on-Tyne City Council to consider the running of trolley buses over the Tyne and High Level Bridges from Newcastle into Gateshead. Newcastle Corporation has secured a Provisional Order empowering it to carry out the extension.

Leeds.—TRAMWAY EXTENSION.—The Minister of War Transport has made the Leeds Corporation Light Railways (Extension) Order, 1945, authorising the construction of a light railway 1 mile 3 chains in length from Belle Isle Road to Middleton Park Road.

Radio Servicing

Test Equipment and Qualifications of Personnel

THE servicing of broadcast radio and television receivers was debated at the December discussion meeting in London of the Radio Section of the Institution of Electrical Engineers.

MR. R. C. G. WILLIAMS introduced the subject, pointing out that many of the present hazards of radio servicing were due to the rapid growth of the industry; dealers had been unable to cope with the increasing complexity of the product. Without a radical change in attitude and quantity production of standard measuring equipment that would make it economic for the dealer properly to equip and staff his service department, dealer servicing was bound to lag behind progress in technique. Without proper professional interest in the training of service men and a sound outlook on the economics of servicing, neither staff nor equipment could be supported.

In the discussion most speakers touched in one way or another on the training of servicing technicians. The emphasis should be on the practical side; familiarity with actual fault finding was exceedingly important in any commercial organisation. The need for a recognised qualification was emphasised and several speakers took the view that the maintenance branch of radio should be regarded, not as a blind-alley occupation, but as a stepping-stone and that some of the personnel of the manufacturer's research and development laboratories should be recruited from this source. Many speakers expressed doubt about the value in the commercial field of the technical training given in the Services during the last six years.

There were many pleas for better liaison between repair organisations and development personnel, which could be of great value to the manufacturer in giving him early warning of unreliable components. Standardisation of components, especially capacitors and knobs, was demanded in order to reduce the number of parts which a repairer had to stock, at present often over 1,000 items and especially important overseas. Very many speakers advocated the adoption of plug-in electrolytic capacitors.

More complete maintenance information should be provided by the manufacturer; both complete and simplified circuit diagrams should be provided, handbooks should explain the functions of circuit details and diagrams of component lay out should indicate " which end was which " of all items.

Regarding test equipment there were two schools of thought. Perhaps the majority view was that a multi-range testing meter, a signal-generator, a valve-voltmeter, an A.F. oscillator and an output meter were essential. Others felt that most functions might well be combined into a single multi-purpose test set, but those of the first opinion thought it was advantageous to have separate instruments. All agreed that a signal-generator rather than a test oscillator was necessary. The advantages of an electronic ohmmeter were stressed and the need for a high-voltage source for insulation testing in television apparatus was pointed out.

Travelling Scholarships

The trustees of Sir James Caird's Travelling Scholarships invite applications for one senior scholarship (value, £200 to £600) and two junior scholarships (value £50 to £250) in engineering, electricity, aeronautics, and music. Particulars and application forms are obtainable from the secretary, Mr. John Pearson, 7, Ward Road, Dundee.

An Underground Citadel

Power Plant and Services in London Stronghold

ACCOMMODATION for the War Cabinet, chiefs of staff and certain Government Departments—some 2,000 persons—was provided during the war at three underground buildings. The largest, which we recently visited, was constructed in Horseferry Road, S.W., in 1940 and completed within a year. Provision was made for the citadel to be habitable for at least three weeks when cut off from the outside world. Principal electrical services to be maintained from the 1,000-kW power station (which like those of the other two citadels was engined by Petter's), were lighting (200 kW), ventilation, air-conditioning, cooking and pumps for an artesian well and for sewage disposal.

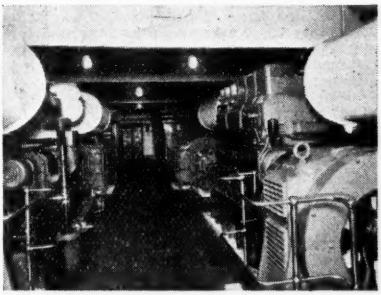
In emergency up to 100,000 cu. ft. of air per min. could be drawn from outside, if necessary through a gas filter, to give four changes of air every hour. In addition 5,280 cu. ft. of recirculated air would be needed for engine combustion and 12,000 cu. ft. for the cooler. Three washer and gas-filtration plants installed by Young, Austen and Young are supplemented by three 175-HP CO_2 compressors of J. & E. Hall's make for refrigeration and a number of Matthews & Yates fans, almost all driven by Bull motors through Kenyon ropes and Texropes. Lubricating oil for the compressors is cleansed in a Hopkinson centrifuge and a Wells filter. Air conditions are maintained at 55 to 60 deg. of relative humidity in conjunction with a temperature of 68 deg. F. Ventilation absorbs up to 230 motor HP and the CO_2 plant 350 HP, plus 60 HP for auxiliaries.

Four 250-kW Generating Sets

Electricity is generated by four sets bolted to solid concrete foundations. Each consists of a two-stroke six-cylinder 375-BHP 500-RPM super-scavenge Petter engine direct-coupled to a 250-kW 400-V Brush alternator with an overload capacity of 10 per cent. for one hour. These sets had to be accommodated 50 ft. below ground level within a space of 35 ft. by 20 ft., apart from the switchboard, coolers and fuel tanks. The 12-hr. rating of 62·5 BHP for each 8¼-in. by 13-in. cylinder corresponds to a mean effective pressure of 67 lb. per sq. in. and a piston speed of 1,083 ft. per min. The associated exhaust temperature (registered by Negretti & Zambra dial thermometers) averages only 550 deg. F—an important item for sub-surface work with exhaust pipes each of 180 ft. run. An unusual feature for an engine of this size is that the cylinder heads are of monobloc oil-cooled cast-iron construction.

Scavenging air is furnished by twin-unit Roots-type Holmes-Connersville blowers driven from the crankshaft by the chain driving the cam-shaft and fitted with a Burgess intake silencer. A 9-in. Burgess exhaust silencer is bolted to the end of the manifold and secondary silencers of the same make are installed outside the engine room. Starting is by compressed air at 350 lb. per sq. in. The bottle is charged either by an electrically driven compressor or by a Broom & Wade compressor driven by a 1½-HP Petter air-cooled petrol engine. Engine circulating water is cooled by two Heenan & Froude plants, the pumps and fan for which are driven by a Brush 4½-HP motor.

The whole of the electrical generating and control equipment is of Brush manufacture. Each alternator is rated at 312·5 kW at 80 per cent. power factor and has a 4·3 kW exciter on an extension of its shaft. A flywheel limits the cyclic irregularity of the set to 1/330. The four sets are designed to operate in parallel with the mains and a Chloride battery maintains essential services for a short period should the bulk supply fail. Each alternator panel includes a Met-Vick carbon-pile voltage regulator and remote speed control. There are five feeder panels. The working of all important services in addition to the power-station plant is under observation by the shift engineer through audible or visual signals, including multi-purpose Negretti & Zambra temperature indicators.



Brush-Petter generating sets at Horseferry Road

A.S.E.E. Arrangements

THIS year, instead of an annual luncheon, the Association of Supervising Electrical Engineers proposes to hold an annual dinner. Members of the Association discharged from the Forces will be invited to attend as guests.

The Executive Council of the A.S.E.E. has decided that the next annual conference shall be held in Birmingham on May 18th next. Motions for the agenda should be sent to the general secretary by March 23rd.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

S. Smith & Sons (England), Ltd.—The activities of the associated companies during the war and their plans for the future were reviewed by Sir Allan Gordon-Smith (chairman and managing director) at the annual meeting last week. He said that Smith's Motor Accessories, Ltd., had developed new and important lines such as car heaters and, in conjunction with the Gramophone Co., had formed a company specialising in car radio. Dealing with Smith's Aircraft Instruments, Ltd., the chairman referred to the development of an entirely new all-electric automatic pilot. With regard to Smith's English Cocks, Ltd., he gave details of the company's plans for expanding the manufacture of electric and mechanical clocks, watches and parts, and said he felt sure that this effort would prove a significant contribution towards re-establishing this country as a leading nation in the field of horology. Smith's Industrial Instruments, Ltd., a new division, had developed a number of instruments for industrial purposes which had previously been made in Germany.

The programme outlined would, he said, necessitate a large capital expenditure on plant and machinery, and just before the Christmas holidays sanction had been received from the Capital Issues Committee to make an issue of shares to existing shareholders. This would be made out of the shares authorised but unissued, and it was intended that they should be offered to the holders of the preferred ordinary and deferred ordinary shares *pro rata.* When all the factories were in full production—which it was anticipated would be in twelve months' time—the company would have at its disposal approximately twice the manufacturing facilities that it possessed before the war.

Calcutta Tramways Co., Ltd.—The company has informed the Calcutta Corporation that the contract entered into between the two parties in September last regarding the purchase of the undertaking by the Corporation is now cancelled and that the proposed arbitration in regard to settling the price of the undertaking should not be proceeded with. According to the company, its contract with the Corporation stands cancelled, since the Corporation has been unable to obtain the assent of all parties concerned, nor has it secured the enactment of proposed legislation, regarding the formation of a Transport Board, or obtained the money necessary for the payment of the purchase price in the contract.—*Reuter.*

Tokyo Electric Light Co., Ltd.—The *Financial Times* reports that according to information available in Tokyo, accrued interest on the company's six per cent. first mortgage debentures from December 15th, 1941, to June 15th, 1943, was paid into the Yokohama Specie Bank Special Account, under Japan's Enemy Property Control Law. It is stated that on December 5th, 1941, the company remitted interest payments due on December 15th to the Guaranty Trust Co. of New York and to Barclays Bank, London, but receipt of neither was acknowledged. Thereafter, until June 15th, 1943, the company, which had changed its name to Kanto Electric Supply, continued paying the interest on both the dollar and sterling series into the Yokohama Specie Bank Special Account. Accrued interest aggregated respectively $1,826,730 and £264,420. On June 15th, 1943, the Japanese Government, under the foreign debt disposal law, assumed all sterling and dollar obligations and forced the company to issue a new yen series. Payment of the blocked funds in the Yokohama Specie Bank depends on the eventual settling of the exchange rate in Tokyo and payment thereafter depends on what happens to the Japanese public debt.

Aero Engines, Ltd.—At the annual general meeting Sir Maurice Bonham Carter, the chairman, announced the proposed change of the company's name to Douglas (Kingswood), Ltd. The company recently secured the sole manufacturing and selling rights for electric vans from A. C. Morrison (Engineers), Ltd.

The General Cable Manufacturing Co., Ltd., proposes to pay a final ordinary dividend of 9 per cent., making 15 per cent. for the year ended September 30th last (same).

Greenwood & Batley, Ltd., are maintaining their interim dividend on the ordinary shares at 5 per cent.

New Companies

Porter Electrical Products, Ltd.—Private company. Registered December 28th. Capital, £1,000. Objects: To carry on the business of electricians, electrical, mechanical, motor, telephone, heating, ventilating and general engineers, etc. Directors: F. Porter, 3, Portsdown Road, Stoneygate, Leicester, and W. T. Manning, 39, Craighill Road, Leicester. Registered office: Room No. 1, Allen House, Newarke Street, Leicester.

Carter Refrigeration and Air Conditioning, Ltd.—Private company. Registered December 29th. Capital, £10,000. Objects: To carry on the business of heating, ventilating, hydraulic and refrigeration engineers, manufacturers of, and dealers in, heaters, boilers, ranges, air filters, refrigerators, cold storage plants, etc. Subscribers: J. Carter, 31, Ladbrook Road, Solihull, Warwickshire, and G. Ireland, 34, Bourton Road, Olton, Warwickshire. Registered office: 181, Corporation Street, Birmingham.

North Electrical Services Co., Ltd.—Private company. Registered December 31st. Capital, £500. Objects: To carry on the business of electricians, electrical engineers, electric lighting and wiring contractors, etc. Directors: W. H. Palmer, The Lodge, Randall Road, Leatherhead, and S. J. Worth, 16, Vincent Lane, Dorking. Registered office: The Lodge, Randall Road, Leatherhead.

Morgan Electrical & Engineering Industries, Ltd.—Private company. Registered December 23rd. Capital, £500. Objects: To carry on the business of electrical, civil, motor, mechanical, chemical and other forms of engineering, sub-

assembling, including components, accessories, parts and fittings in relation to aircraft of all kinds, motor vehicles, ships, etc. Subscribers: W. Blackamore, "St. Lawrence," Craven Estate, Chelsfield, Kent, and Anne Simmons, 100, Harland Avenue, Sidcup, Kent. Registered office: 4/6, High Street, Putney, S.W.15.

Robak Electric, Ltd.—Private company. Registered December 29th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in (both wholesale and retail), all classes of electrical and mechanical instruments, and apparatus and supplies of all kinds, etc. Directors: E. L. Rogers, "St. Rule," Austin Road, Guildford, and two others. Registered office: 93, Woodbridge Road, Guildford.

Lotem, Ltd.—Private company. Registered December 31st. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, electric cables and cable casings, insulated, fuse and other wire, flexible cord, etc. Subscribers: W. B. Medlam, 64, St. Dunstan's Avenue, Acton, W.3, and Eveyln D. Fidler, 214, New Kings Road, Fulham, S.W.6.

Classic Electrical Manufacturing Co., Ltd.—Private company. Registered January 1st. Capital, £2,000. Objects: To carry on the business of electrical, radio, television, mechanical and general engineers, etc. Directors: J. H. Kendall (chairman), 27, Brockenhurst Road, Croydon, and L. Wilkinson, 123, Shirley Avenue, Croydon. Registered office: 352, Lower Addiscombe Road, Croydon.

Manton's Electrics, Ltd.—Private company. Registered January 1st. Capital, £800. Objects: To carry on the business of electrical, constructional, wireless, electro-medical, cinematograph and general engineers, etc. Directors: J. Berliand, Burwood Oak, Burwood Park, Walton-on-Thames, Surrey, and two others. Registered office: 1, Copse Road, Cobham, Surrey.

Shurstand Base & Electrical Co., Ltd.—Private company. Registered December 13th. Capital, £100. Objects: To carry on the business of manufacturers and factors of, agents for, and dealers in, electrical fittings, apparatus and equipment of all kinds, etc. Directors: F. E. Martin, 38, Ashburnham Mansions, Ashburnham Road, Chelsea, S.W.10, and two others. Registered office: 3, North End Road, West Kensington, W.14.

James G. Wedderspoon & Co., Ltd.—Private company. Registered in Edinburgh December 19th. Capital, £1,000. Objects: To carry on the business of general and electrical engineers, building and general contractors, etc. Directors: J. G. Wedderspoon, 47, Hawley Road, Falkirk, and J. A. McIntyre, 80, Glasgow Road, Camelon, Falkirk. Secretary: J. G. Wedderspoon. Registered office: East End Tan Works, East Bridge Street, Falkirk.

Mortgages and Charges

Claytelec, Ltd.—Assignment of moneys under contract, dated November 27th, 1945, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Browning's Electric Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated December 3rd, 1945, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Liquidations

I.C.I. (General Chemicals), Ltd.—Winding-up voluntarily. Liquidator, Mr. C. F. Bristol, I.C.I. (General Chemicals), Ltd., Cunard Building, Liverpool.

I.C.I. Metals, Ltd.—Winding-up voluntarily. Liquidator, Mr. G. Norton, I.C.I. Metals, Ltd., Kynoch Works, Witton, Birmingham.

Bankruptcies

T. C. Cottrell, electrician, 31, Autumn Street, Burley Lodge Road, Leeds.—Application for discharge to be heard on January 30th at the County Court House, Albion Place, Leeds.

Surplus War Stores

Methods of Disposal

WHEN the British Electrical and Allied Manufacturers' Association considered the matter of the disposal of surplus industrial electrical equipment remaining in the hands of Government Departments at the end of the war it proposed that there should be an advisory panel and a disposals company. The function of the panel would be to determine what stores were available for disposal, which of them should be placed on the market and which should be scrapped. It would also advise upon the prices to be charged for the material.

It was proposed that the company should be given first option to purchase the equipment at specified prices and dispose of it on a non-profit-making basis. Membership of the company would be open to all branches of the electrical industry, manufacturing or otherwise.

Now, it is announced, the Ministry of Supply has decided that there shall not be a disposals company and that surplus equipment shall be disposed of through the normal administrative channels of the Ministry on the advice of an advisory panel on which B.E.A.M.A. will be represented by Mr. D. M. Buist.

The equipment covered by the scheme includes the following:—Arc-welding plant and electrodes; resistance welding plant; condensers for power factor correction; converting plant; dynamos and motors of all types up to 1,000 HP, kW or kVA; instruments and instrument transformers; motor control gear; switch- and fuse-gear; transformers (suggested limit 2,500 kVA); and "such other descriptions of equipment and goods as may from time to time be added by agreement between the Minister and the Panel."

We have been notified that the Association of Electrical Machinery Traders is to have four representatives on the Advisory Panel; they are Mr. W. E. Lawton (chairman of the Association), Mr. T. A. Atkinson, Mr. H. F K. Dearlove and Mr. H. Vernon.

STOCKS AND SHARES

THE first week's work of the New Year in Stock Exchange markets provided the House with a reasonable measure of employment. There was a flow into stocks and shares of capital previously held back by the "window-dressers." These funds were enlarged by distribution of dividends payable at the New Year. Income tax and surtax made large demands, which, however, did not affect the steady absorption of gilt-edged stock in the markets. Prices of Home Railway prior charges, of which Southern Railway 5 per cent. preference is a good example, have recovered from the recent depression. Another catalogue of rises in the preference shares of Home electricity supply companies is a witness to the dispersal of previous fears as to their stability.

Preference Shares Wanted

The revival of confidence in the preference shares of companies on the "nationalisation" programme, has continued to be a marked feature of the industrial markets. It began, just before Christmas, on the appearance of the Coal Nationalisation Bill with its clause indicating that holders of preference capital in nationalised industries might be compensated on an income basis, rather than on the lines of a liquidation, which might involve the manifest injustice of repayment at par. Jobbers in the market for electricity supply shares are again printing lists of the preference issues which they now want to buy.

The Coal Bill is thought, in the Stock Exchange market, likely to take at least two years to come into practical operation through the exchange of the existing stocks and shares for Government stock. If this estimate proves to be anywhere near the mark, it suggests that nationalisation of the electricity supply industry will hardly be started upon until some time in 1948 at the earliest.

Cable & Wireless

Other "nationalisation" stocks to come under fresh consideration in the light of the coal industry proposals, include those of Cable & Wireless. The reaction here has been a hardening of the 5½ per cent. preference stock to 112½, with little change in the ordinary. For Cable & Wireless, however, the considerations are more oblique than they are in the case of the companies to be nationalised outright, since it is only the operating subsidiaries which are to be taken over. The Holding Company, in which the public is interested, will presumably still retain its fate in its own hands.

Electric & Musical

In the demand that has arisen of late for shares connected with the radio industry, those of the Electric & Musical Industries seem to have been overlooked, if not ignored. Surprise is expressed at the sluggishness of the price in view of the improvement recently shown by others in the same group. The present, 33s. 3d., is half a crown lower than the price a year ago, but is about equally higher than the 31s. at which the price stood in the middle of August, when television prospects were being actively discussed. The company has paid an annual 6 per cent. dividend on the 10s. ordinary for the past five years. In the last three years, this was accompanied by a bonus of 2 per cent., making 8 per cent. for the year, and earnings showed little margin over the rate distributed. The yield on the shares is a modest £2 8s. per cent.

Calcutta Trams

Price fluctuations are comparatively few and insignificant. Sharp fluctuations occurred in Calcutta Tramways. The shares were standing at 80s., but the price gave way abruptly to 69s. upon the announcement from Calcutta that the company had informed the Corporation that the contract regarding the purchase of the undertaking was now cancelled and that the proposed arbitration in regard to settling the price of the undertaking could not be proceeded with. Apparently this is due to the Corporation's having been unable to obtain the assent of all parties concerned with the matter of the purchase of the undertaking. A recovery to 74s. left the price 8s. 6d. down on the week.

Switchgear & Cowans

The price of Switchgear & Cowans rarely moves: it has remained between £1 and a guinea for weeks past. Several thousand shares changed hands recently on a slightly higher basis, and the price has hardened to 22s. 6d. For the past three years, the company has paid an annual dividend of 20 per cent. on its 5s. shares. This allows at the present price a yield of £4 9s. per cent. on the money. The company owns all the shares of the Eastnor Electric Co., Ltd., Richard Wiffen, Ltd., and W. W. Buckley & Sons, Ltd. The company's year ends with December, and it is assumed that the dividend will be continued at 20 per cent.

Dated Stocks

In the list of stocks and shares dealt with in these columns are certain issues of the Central Electricity and London Passenger Transport Boards to which dates of repayment are attached. In most cases, two dates are given, the borrowers having the option to repay the loan at any time from one date to another. Investors who are in the habit of buying stocks that carry fixed dates, usually have some special purpose in view. In order to carry out their object they frequently pay a somewhat higher price than they would give for an irredeemable stock of similar nature. The question arises as to how these dated stocks will be dealt with under a nationalisation scheme. So many and so varied are the interests involved that a definite pronouncement would seem to be eminently desirable.